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[OFFICIAL NOTICE.]

Detroit Meeting, American Gas Institute.

HEADQUARTERS, AMERICAN GAS INSTITUTE,
25 West 39th street, New York, Sept. 23d, 1909.

The following preliminary outline of the plans underway for the Detroit meeting of the American Gas Institute, to be held in that city, October 20, 21 and 22, may be of interest. The Committee of Arrangements, as appointed by President Prichard, was made up as follows: Irvin Butterworth, Chairman; J. T. Lynn, J. J. Knight, B. O. Tippy, W. T. Barbour, W. S. Blauvelt.

With the approval of the President, Mr. Butterworth has added to the list a number of men prominent in the gas industry. The Sub-Committees are now arranged as follows:

Ways and Means Committee.—James T. Lynn, Chairman; W. T. Barbour, Geo. H. Barbour, James W. Dwyer, John J. Knight, Frank Hulswit, Lazard Kahn, D. J. Collins, J. N. Williamson.

Smoker.—Jules G. Hoffman, Chairman; Alonzo P. Ewing, A. L. Zwisler, F. P. Mueller, Ed. Leaky.

Boat Trip.—V. F. Dewey, Chairman; W. S. Blauvelt, Jas. Foley, Roy Shacklette.

Entertainment of Ladies.—H. L. Olds, Chairman; W. G. Henry, W. R. Vanvalkenburg, Andrew H. Green, Jr., Samuel T. Douglas, W. E. Moss, B. O. Tippy, Stanhope Boal, W. C. Kennedy, George D. Roper, George M. Clark, Charles H. Dickey, A. T. Knowlson.

Hotels, Hall and Information.—E. F. Lloyd, Chairman; George Osius, Edward M. Mabcourt, G. O. Ciliax.

The Committee has decided to arrange for an informal "Smoker" at the Wayne Pavilion, instead of a banquet. There will be a theater party, luncheon at the Country Club and trips about the city for the ladies. A steamboat trip to Lake St. Clair, down the river to Bois Blanc, including an inspection of the very interesting engineering work at the new channel, and a visit to the Solvay Process plant, will be features. The headquarters will be at the Pontchartrain, and the meetings will be held at Elks' Hall, only a block distant.

Mr. R. B. Brown, Chairman of the Technical Committee, advises that about 16 papers are being prepared, and that Dr. Hyde has consented to give a lecture on "Illuminating Engineering."

There will be three good papers on commercial subjects, one on "Accounting," one on "Illuminating Engineering in Practical Applications," and a first-class technical and general programme.

The reports from the "Wrinkle Department," "Bureau of Information," and the various committees, will contain matter of unusual interest.

HOTEL ACCOMMODATIONS.

The following hotel information is presented for your consideration:

Hotel Pontchartrain—European Plan.—Rooms with hot and cold running water, 1 person in room, $2 to $2.50 per day. Room with hot and cold running water, 2 persons in room, $3 to $4 per day; room with bath, 1 person in room, $3, $3.50, $4, $5 per day; 2 persons, $5, $6, $7, $8 per day. This hotel will take care of about 250 people comfortably. They advise, however, that they have not very many single rooms, and it will be advisable for people desiring reservations to make them as quickly as possible. This hotel will be headquarters, and will be remembered by previous visitors to Detroit as on the site of the old Russell House. It is within sight of and about 2 minutes' walk from the Convention Hall. It is reached from all depots by any car at the depot without change.

Hotel Cadillac—European and American Plan.—Rooms without bath on the American plan $3.50 and $4 per day, each person; rooms with bath, $4, $5, $6, $7, $8 per day, each person. Rooms without bath, on the European plan, $2 to $2.50 per day, each person. Rooms with bath, $3, $3.50, $4, $5, $6 per day each person. They can accommodate 100 to 150 people. This hotel is located at the corner of Michigan avenue and Washington boulevard, and is 5 minutes' walk from the meeting hall, with a direct car line thereto. It is reached by car line from all depots, transferring at the City Hall to Michigan car. Transfer point is 3 blocks from hotel.

Wayne Hotel.—American Plan.—Without bath, $2.50 to $4 per day; with bath, $4.50 per day.

European Plan.—Room without bath, $1.50 to $2 per day; with bath, $2.50 to $3 per day. Two persons in one room, without bath, $2.50 to $3 per day; with bath, $4 to $4.50 per day.

This hotel will be able to accomodate about 50 people, and is located across from the Michigan Central depot and overlooking the river. It is 7 minutes by direct car line to the meeting hall and about 15 or 20 minutes' walk. The "Smoker" for Thursday evening will be held in the pavillion annex of this hotel.

Hotel Tuller.—European Plan.—Every room with bath, 1 person in a room, $2 to $4; 2 persons in a room, $3 to $5. They can accommodate about 100 people. The hotel is located at the corner of Adams and Park, which is one block off Woodward, facing Grand Circus Park, and is about 5 minutes walk from the meeting hall. It is reached by Woodward car line from Michigan Central depot. From Lake Shore, Grand Trunk and Union depots by any car with transfer to Woodward.

Hotel Ste. Claire.—American Plan.—With bath for one, $3.50 and $4; two, $7 and $8. Without bath for one, $2.50 and $3; two, $5 and $6. This hotel will accommodate 50 or 60 people nicely. It is located at the head of Monroe avenue, in sight of and two minutes walk from the meeting hall. It is reached by all car lines from depots, trans-

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ferring to Michigan car at City Hall. Transfer point is 3 blocks from hotel. Cars from Lake Shore depot pass hotel.

Griswold House.—European Plan.—Rooms, with running hot and cold water, $1 per day; rooms, with bath, $1.50 and $2 per day. Where more than one person occupies the same room, the rate for each additional person is $1 per day. The hotel is located at the corner of Grand River avenue and Griswold street, about 5 minutes walk from meeting hall. Is reached by Woodward cars from Michigan Central depot within one short block. Is reached from Union, Lake Shore and Grand Trunk depots by transfer to Jefferson cars, which pass the door.

Hotel Normandie.—European and American Plan.—European plan: $1, $1.50, $2 per day, without bath; $2, $2.50 per day, with bath. Where two or more occupy the same room, a reduction of 50 cents is made, except with the minimum rate. This hotel is located on Congress street, ½ block east of Woodward, and in the same block as the Pontchartrain. Five minutes walk from meeting hall, and is reached direct by car line from all depots.

Hotel Metropole.—European Plan.[1]—Rooms, without bath, $1; with bath, $1.50. This hotel is located on Woodward avenue, alongside the Pontchartrain.

Oriental Hotel.—European Plan.[2]—$1 to $2 per day, *with free use* of the plunge and shower baths. This hotel also has Turkish and Russian bath house annex, and is located on Farrar street near Gratiot avenue, about 3 minutes' walk from the meeting hall. Is reached within 2 blocks by direct car line from any depot.

In going over the matter with the hotel people they urge that everyone who is going to attend the convention, write and engage their accommodations, and that this be done with very little delay. They should state exactly the date and hour when they expect to arrive, if not in the first communication reserving the room, at least in a subsequent communication to the hotel in order that the accommodations may be ready for them on arrival.

Detroit is particularly a Convention City, and a clearing point for tourists to all points north, as well as a gateway for tourists and commercial travel east and west, hence in the middle of October, if accommodations are not properly reserved, it may be difficult to get anything suitable or satisfactory. A. B. Beadle, Secretary.

BRIEFLY TOLD.

Obituary Note.—Mr. George D. Bill.—The death of Mr. George Dana Bill, whose summons was answered the morning of September 11th, at his home on Lincoln street, Malden, of which place he had been a resident since 1876, perhaps will not appeal with directness to the fraternity at large, since his connection with the industry was altogether with one Eastern Company, but it will appeal strongly to those who worked in the field under him, for his personality was such as to endear him well to his co-workers and friends. George Dana Bill was born in Saxonville, Mass., August 26th, 1834, and early in life removed to Waltham, Mass., where he learned the principles of machine shop management. About 1876 he resigned from the service of the Newton and Watertown (Mass.) Gas Light Company to take the position of Superintendent of the Malden and Melrose (Mass.) Gas Light Company, which place he filled creditably for 20 years, or until 1896, in which year the property was taken over for operation on syndicate account. During the 20 years he was with the Malden corporation he had much to do with the financial management thereof, and served it as Treasurer for two or more terms acceptably and well. In 1896, when the Company changed hands, Mr. Bill elected to take up the general contracting business, with headquarters in Malden. In this line of work he also prospered. Deceased was early admitted to membership in the New England Association of Gas Engineers—we think he was admitted at the 1879 meeting—and was at one time quite prominent in its affairs. He was an organizer of the Guild of Gas Managers and it was in this body that he kept close in touch to the end with the profession that he honored so well. He was prominent in Masonic circles, which order he joined at an early period in his life, and at the end his active affiliation therewith was in Monitor Lodge, Waltham. He is survived by his widow, a daughter and three sons—two of whom (Benjamin P. and Waldo C.) are now actively connected with the industry. The funeral services were really held in Waltham, at the home of his sister (Mrs. Harriet Parmenter), the Reverend W. F. Dusseault officiating. The pall bearers were Messrs. H. A. and A. E. Norton, N. W. Gifford and Joseph Tufts. Beautiful floral tokens, amongst the great profusion of such reminders that were grouped about the casket, were from the Guild of Gas Managers and from the New England Association of Gas Engineers. He was a most lovable man, and his memory will be to many as the faint odor of thyme to some, through reawakening to the glories of that old fashioned flower when in bloom it burnishes hill and glen. We are indebted to the courtesy of Mr. H. A. Norton for matter connected with this short history.

1. Strictly "stag." 2. Strictly "stag."

The Third Annual Convention of the Illuminating Engineering Society.—The Hudson-Fulton celebration will long be remembered in and about New York City as "Illumination week," and especially by those connected with the artificial lighting industry—not altogether pleasantly by the rank-and-file of the electric end of the supply; for, to tell the truth, 'twas often touch and go as to whether the "juice" would hold out, at the very critical moment, too. However, up-to-time we may say that all's well. The Society held its Third Annual Convention during the midst of the celebration, and the technical threads which hemmed it in were really of stout order when one considers the excellent attendance which greeted the officers during the times when the technical sessions were on. The topics treated of were brought out in the medium of 18 separate papers, one lecture, 3 reports and 3 addresses. The discussions were of the sort and nature that bring about good results, and the standing of those in attendance at the gathering would do great credit to many a more imposing and vastly important Society, viewed in the imposing and important lights, of course, through the glass of time as to length of life. In fact, not many technical bodies could on demand assemble a larger number of men known to the arts. Of course, one may be pardoned for taking unto one's-self that which one has acquired, and we are up to claiming that the complete success of the convention was largely due to the interest this time positively manifested by the gas fraternity in the absolute and active doing of and for the convention, between the time of its call and its termination, all that could be done. And this especial evidence of activity was to show their loyalty in support of the Society's President, Mr. W. H. Gartley. And of him in this connection it may be further said that his conducting of the meeting was simply flawless.

Special Western Correspondence.—"L.," writing from Detroit under date of the 28th September, says: The custodian of the post office at Detroit recently received a letter from the Treasury Department, Washington, D. C., authorizing him to accept the trial installation of Reflex gas burners installed in the Detroit post office by the Detroit Gas Company. It was further stated that gas was to be used exclusively throughout the building for lighting, save in the lobby on the first floor, where the fixtures being constructed for the use of tungsten lamps, gas burners could not be employed without some disfigurement. He was also authorized to solicit proposals from the Detroit City Gas Company for installing in the work room, money order and registry departments, Superintendent of Mails, and in the carriers' room, also the rooms of the Postmaster and Assistant Postmaster, the necessary number of Reflex burners and Reflex clusters. It was proven by this experimental installation that gas was not only affording a superior but a more economical lighting result than was being obtained from the electric lamps, and, in accordance therewith, all electric equipment is to be removed except that necessary for the operating of the various fans and the lighting of the lobby. Therd are 81 Reflex burners, 46 of which are placed over the carriers' cases, and two 3-light Reflex clusters, three 21-light and two 4-light clusters, with two pendants. The ending of this trial test opens the way for gas companies in other cities throughout the State that are not at present lighting their post offices, and especially in cities where new buildings are being erected. Another big deal closed by the Detroit City Gas Company last week was for the installation of 56 gas arc lamps at the shops of the Hudson Motor Car Company. This installation displaces one of electricity. The Company, by-the-way, generates its own current.

CURRENT MENTION.—

The Gas Bench Construction Company, of St. Louis, is under contract to put in two of its modern benches of inclines at the works of the Calumet Gas Company, Lawrence, Mich.

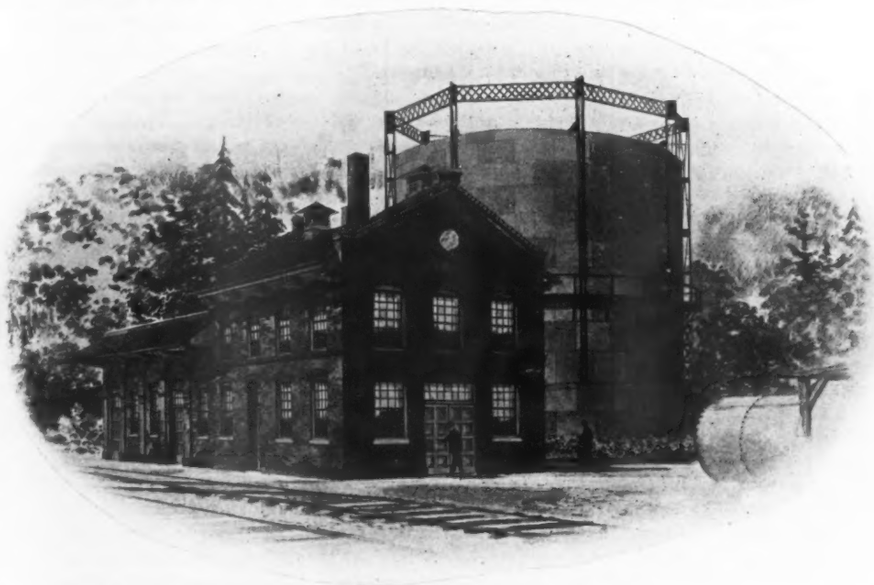
Mr. Walter A. Leuenberger who resigned from the service of the Racine (Wis.) Gas Light Company, as Superintendent thereof, to take up a similar position with the Tacoma (Wash.) Company, is in working tune in his new role. He asserts that it is a vast country. And it really is.

Messrs. W. A. Bixby and G. A. McCollum have about convinced the Pierce City (Mo.) authorities that a central gas and electric plant, at Springfield, Mo., for instance, would be better for the former place than a separate plant at each place. In fact, it is thought that the project will eventually include a single plant for all the territory between Carthage and Springfield.

The Plant of the Saranac Lake Gas Company.

The illustration shows fairly the buildings and holder now being constructed at Saranac Lake, N. Y., by the Public Utilities Company, Franklin Bank Building, Philadelphia, which structures are coming in for considerable favorable comment by the citizens. The entire affair will not afford a blot on the landscape, as unfortunately some of the smaller gas plants constructed in suburban places ofttimes are. In fact, the ensemble is usually of the severe or grotesque order rather than having the appearance of a design worked out by competent engineers. Gas companies too frequently forget they owe something to the public in their construction, when, by using a little precaution and at small extra expense, work can be designed that are creditable to the community and living monuments as well to the capacity of the designers. Abroad, this feature is taken into consideration, but in our own country, it looks for utility and nothing for appearances.

The appearance of the plant can be easily caused to take on attraction of the advertising sort for the town as well as a place of good abode for the Company's men. To go further, this same ornate



finishing might be profitably carried on to the carts, wagons, etc., of the Company. At any rate the Public Utilities Company has eyes to this suggested feature, which is frequently lacking in the buildings turned out by gas engineers in this and other countries.

The walls of the main building are of red brick, laid lengthwise, with black headers, in 1-inch buff gravel and cement joints. The roof is of Ludovici tile, and all of the material and workmanship are of the highest grades. The designer was Mr. Charles Barton Keene, one of the prominent architects of Philadelphia, and the generating machinery is being installed by the Gas Machinery Company, of Cleveland, O. The storage holder is by the Cruse-Kemper Company, of Ambler, Pa.

The plant will be ready for operation about the 1st of November, in fact it may be considered completed now. It will begin operation with about 500 consumers, which surely is an excellent beginning in a town of not over 6,000 residents. However, most of the people residing in Saranac Lake have used gas elsewhere, and the community as an entity is one that should cause this plant to be a paying proposition from the start.

A Gas Exposition as a Means of Advertising.

[A paper read by Mr. John D. Kuster, at the 17th Convention, Pacific Coast Gas Association.]

It was suggested by the General Manager that each of the District Managers of the Pacific Gas and Electric Company do something in the nature of educational work, consequently a cooking school was determined on for the Fresno District, and an appropriation of $300 was granted, covering expense of same, as an experiment for a week.

Realizing that a cooking school without an exhibition of gas appliances would be but a partial success, an effort was made to get the local hardware men interested in the scheme. Their co-operation was not hard to get, as the gas company had, a year previously, turned over to them, entirely, the handling of appliances, with the single exception of gas arcs. Meetings were held in the gas company's office and a committee selected to arrange all details.

A vacant hall, 140 feet long by 26 feet wide, was secured. This was spaced off into booths, about 8 feet by 20 feet, and space selected by drawing lots. The exhibitions were given in the front portion of the hall while the rear 60 feet was retained for seating the guests. Between the auditorium and the exhibition, a raised platform, about 10 feet square, was erected for the use of the demonstratress and lecturess, who, by-the-way, was Miss Suzanne Tracy, of San Francisco. An aisle, 8 feet wide, was left throughout the entire center of the hall, but during the lecture it was found necessary to arrange seats on each side, as our meetings were more popular than we had hoped. This arrangement of the hall was the best to be had under the circumstances, but the ideal plan would be to secure two halls adjoining and opening into each other, one for the exhibits the other for the lecture room, so arranged that visitors must pass through the exhibit to the auditorium. This arrangement permits exhibitors to show their appliances without disturbing the lecturer or her audience. A loop of 1¼-inch pipe was laid against the walls, with tees every 10 feet and connected to 2 services, insuring a perfect supply of gas for all purposes.

The newspaper advertising was ably conducted by "Hill's Advertising Agency," and consisted of extra space for the initial announcements a few days in advance of the opening day, and star locals and special write-ups after school opened. A city election of more than ordinary importance was to be held on Monday, the day preceding our opening day. Realizing that few advertisements would appear, we decided to invite all the appliance men to join with us and make an extra effort to cluster our advertisements on this day. Consequently, the gas company occupied the center of the page and the appliance men secured the space surrounding it. This gave the exposition special prominence. Individual invitations were not sent out, but window cards were placed in prominent windows, a large banner was placed over the entrance to the exposition, invitations were sent to the High School, and hundreds were specially invited by employees of the gas company and appliance firms.

In this connection it would be an easy matter to give the exposition wide publicity through the numerous women's clubs. There are many ways in which the news that a cooking school is in progress, can be made to travel rapidly, for most women are deeply interested in good things to eat, and are anxious to know how to prepare them. Let it be known what the programme for each day is to consist of. Just what days will be devoted to pastry and salads, or for roasting and broiling, or for baking bread and cakes. Announce that certain days are to be given to the attention of requests from our guests. Appeal to the nurses of the city and give instructions on "How and What to Cook for the Sick Room," or some little catchy idea might attract attention and get the women to talking over the garden fence or at their card parties. As, for instance, announce that you are going to show them that a large cake of ice may be put into a gas range so as to reduce the temperature as near the freezing point as possible. The temperature will be taken and the time noted. You will then light the oven and in 7 minutes you will turn out the finest biscuits to be had in town.

A day should be set aside occasionally for the special instruction of servant girls, not the girls who superintend, but those who do the actual cooking. Make these lectures cover everything pertaining to the kitchen and dining room; how to keep the range clean and sanitary; how to properly light the burners and adjust them so as to get the proper combustion and heat, and at the same time how to economize in the use of gas; how to prepare a 4 or 5-course dinner or a small luncheon, and, what is almost as important, how to serve it after it is prepared. Many of the servant girls would be compelled to attend and they would soon become interested and attend from choice.

Many of these very servant girls are destined some day to become the wives of mechanics and artisans, the men with moderate incomes, who are the larger and most desirable proportion of our consumers, whose wives do their own housework. The woman who does her own work, if given a chance to exercise her choice, will use gas.

The selection of a range for demonstration work will give you some concern, for each exhibitor will grieve when his range is not before the public. This is where the lecturer must use her tact and treat all gas ranges alike, giving preference only to the cabinet ranges, which should always be selected. I suggest a cabinet range because the human race in general are imitators, and the comfort and ease of cooking on such a range are brought forcibly to the attention of everyone—the usefulness of the oven and broiler are so obvious that the fryingpan will soon be relegated to the junk pile. I believe special inducements should be held out by gas companies to prospective consumers to induce them to use cabinet ranges.

In our educational work we should make haste slowly. Do not attempt too much. Gas men are busy men and are usually rushing about and become impatient if the world about them appears to be more deliberate.

Three lectures a week will accomplish greater results than six. The many details of preparation must be in a large measure looked after in person by the lecturer. The successful lecturer must be of a nervous temperament and full of vim to hold the attention of 300 or 400 other women for 1½ hours, and if you will drop in half an hour after the close of the lecture you will find 25 women still pouring out their troubles. The sweet, sunny disposition of the successful demonstrator can be kept up only by having plenty of time for recreation.

The manager holding the exposition should attend the lectures, all of them, and stay to to the finish. He should be there with the welcoming handshake, and it would not hurt him to give a 5-minute talk each day, I believe it pays to do these things.

Each guest should be presented with some souvenir, something cheap, yet novel, but of such a character that she would take it home. Small folders containing some of the best recipes used by the lecturer and some of her slogans on gas economy should be distributed. One page might contain the programme and dates of the lecture course.

In large cities this work should be carried on constantly throughout the year. In small cities from 1 week to 3 or 4 weeks each year might cover the field. Results may not appear as soon as you hope for, and the appliance men may not have placed as many orders as you expected, but you may rest assured that some of the seed sown has not fallen upon the rocks. The stimulant your efforts might have had on each local dealer has been worth while. Each appliance man is confronted with the fact that his line is compared with every other line in town, and his natural pride will compel him to put on a good exhibit and carry a full line in stock. The dealers learn something of the selling points of their own lines, and also how to put up and regulate the heaters and ranges, special salesmen will come in from the branch wholesale houses. Few of the local dealers have given enough attention to the gas range to even know how to light the oven, and when it comes to adjustment they are thoroughly at sea. Special salesmen came from San Francisco, Oakland, Berkeley, Los Angeles and Portland to visit our gas exposition at Fresno, and they were mighty welcome, too. There seems to be a sort of wireless telegraphy that keeps them advised of what is doing. When the local dealers are driven by business rivalry to make a good display, they naturally begin to sit up and take notice, and gradually absorb same of the enthusiasm of the demonstrator and special salesman, and before he himself realizes it he has become a live wire.

Your guests who have been instructed and entertained and have gotten acquainted with a few pleasant people go to their homes feeling better toward the gas company. Few can resist that impelling force—sincerity—and they soon see that enthusiasm and sincerity, with a knowledge of the business, are the ammunition with which the representatives or the company work.

I do not know what is being done in the State toward the teaching of "Domestic Science" in the public schools, but it should be some one's business to find out, and see to it that such a course was started in every city and that the classroom was equipped with the most modern appliances. Then carry it a step further, if possible; see that this course was made compulsory—boys and girls alike—but given such prominence that the work would be dignified and popular.

Demonstration work is merely a plan of education. The newspaper man would call it advertising, which perhaps it is, but it is judicious advertising, enthusiastic advertising—advertising for a purpose; and that purpose broadens its scope according to the thought and intelligence and ginger put into it.

We must learn to do something more than have our cards in the papers. There is nothing unethical about letting the people know that, while our product is invisible, yet it has the power to do great work, and that its uses have increased with wonderful rapidity during the past 10 years. We are large enough to believe that the coming generations have deep-hidden secrets yet to unfold. The load factor is yet far from the 100 per cent. ideal, and the speed with which we approach that ideal will be determined largely by the educational team work we do, and in that team work the Gas Exposition plays a most important part.

Damage Claims: A Modern View.

[A paper read by Mr. John P. Coghlan, at the 17th Convention, Pacific Coast Gas Association.]

Damage claims, no matter in what industry they arise, naturally divide themselves into two classes: Those arising from injuries to property and those arising from injuries to persons. Injuries to the former are easily disposed of, as they involve only the damage or destruction of what has been or can be produced with money, and are satisfied when the loss inflicted is measured and paid for according to market standards.

Personal injuries, on the other hand, involve all the human elements—the home, the relation of the individual to society, often life itself. Their causes and effects are as complex as our modern industrial conditions, and, like those conditions, are constantly in a state of evolution.

No one, perhaps, is more affected than the employer; for, of all personal injuries, as he knows them, more than ¾ occur to workmen in the line of their employment. Yet the employer seems to be the last to observe the change that is going on. Except in rare instances he clings to the point of view of years ago; he still sees the relation between himself and his employee as those before him saw it, in the days of the stage coach and the hand press.

This is largely due to the fact that in the beginning the law circumscribed both the employer and the employee. It assumed, because the employer purchased labor and the employee sold it, that relationship between them was one of implied contract. As incidental to that contract it reasoned, that, as the employer selected the place of employment, it was his duty to make it reasonably safe, and that as the workman chose to enter the trade or industry in which the employer was engaged, he assumed its ordinary risks and hazards. One of these ordinary risks and hazards was the negligence of fellow servants. The idea of the law was that the negligence of fellow servants was as likely to be known to the workman as to the employer and, if he did not want to assume that, and the other risks, of his calling, he could leave and seek employment elsewhere. Moreover, it was believed that both the ordinary risk of the employment and the negligence of fellow servants were perils that could be provided for in the rate of compensation.

This doctrine was the outgrowth of a time when the master and servant were close to each other, and when most manufacturing was done by hand or with simple machinery. At that, it is not old as time is ordinarily measured. The first case involving damages to an employee to get into court was decided in England in 1832. It was a case growing out of injuries received in the overturning of a stage coach. The principles there laid down were brought over to this country, first, in South Carolina, and then in Massachusetts, applied to American conditions. In the Massachusetts case, Farwell *vs.* The Boston and Worcester Railway Company, great stress was laid upon the rule that the employee assumes the ricks of his employment and the negligence of his fellow servants. It projected a line of reasoning that was soon adopted by all the courts of the United States. As time passed the doctrine, instead of advancing, was being continually carried back to the first case, the lawyers and judges of the country looking behind for precedent, rather than ahead for progress and development.

Meanwhile the status of the employee changed rapidly. From a condition in which he worked under the master's eye and often at his side, he passed into a state in which he became but a part of a great machine. Instead of working with a few men, generally less than a dozen, he found himself one of many hundreds. For fellow servants he frequently had men he never saw, or even heard of, many of them miles away. He had nothing to do with their employment, and knew nothing of their skill or want of it. Yet when injury befell him he

found he was regarded in the same light as when he worked with his hands and as the personal servant of his master. He learned that perhaps as superintendent or manager he was always considered in another sphere than his fellow servant, and that the mistake of that superintendent or manager was one of the risks he had assumed when he accepted employment. Or perhaps he found that he had assumed a hazard that came from the breaking of an immense machine, that he neither set up nor operated.

When he came to a realization of his position, the workman's first effort was to shift more of the burden to the employer. His idea was that he would be relieved if he could put the negligence of his fellow servants and the risk of the employment upon his master. With that end in view, he began to influence legislation, and in a short time succeeded in England in having the risk of the employment transferred to the employer, and the fellow servant rule so altered as to exclude from it managers and superintendent, and, finally, all employees engaged in different departments of labor than himself.

From England this modification, like the original doctrine, traveled to this country. It was adopted in Alabama, in 1885, and in Massachusetts in 1887. Since then, it has been accepted with some minor changes in 28 States. Colorado has abolished the fellow servant rule entirely. California has excluded from it all agents or officers superior to the employee injured, and all employees engaged in other departments of labor. It has furthermore provided that knowledge of the defective or unsafe character of machinery or appliances used in his trade shall not bind the employee unless it appear that he "fully understood, comprehended and appreciated the dangers incident to the use" of such defective or unsafe machinery or appliances.

This change in the relation of the employer to his employee was quite radical, but it did not establish any new basis of liability. It was merely taking the common law as it stood and, declaring that, when an injury happened through the hazards of the employment or the negligence of fellow servants, it was more fair that the employer should bear the loss than the employee. While it removed some of the burden from the workman it did not give him a new or more humane method of compensation.

The law-makers of England saw this very early and looked about for a better plan. They found it in Germany and other countries of Continental Europe, in a system which provided compensation regardless of how the injury occurred. It was a system that differed essentially from anything England had known in that it disregarded entirely the old common law principle of liability. It treated injuries to workmen as an incident to industry, and kept the burden of those injuries off both the workman and the employer, placing it upon the trade in which both were engaged.

This system England adopted in 1897 and widely expanded in 1900 and 1906. As finally put into effect it provided a definite compensation for injuries of every character. To the employee temporarily incapacitated, it furnished half-pay; in case of death, it allowed his dependents a sum equal to 3 times his annual earnings. The compensation was provided no matter how the injury occurred, whether by the workman's own fault, unless it be by his "Willful misconduct," or by the fault of the employer, or by nobody's fault.

The English act departed from the German, however, in one important point. It compelled the employer to provide the compensation. The Germans made the compensation payable out of an insurance fund maintained about equally between the employer and the employee. They reasoned that both would take it out of the industry in which they were engaged—the workman by obtaining a wage high enough to include the premium to the insurance fund and the employer by adding his proportion to the cost of production.

The English went at it more bluntly. They put the expense bodily upon the employer, to let him add it to the cost of his commodities and so pass it on to the customer. Both systems have the same effect, however; that is, to diffuse the shock of accidents, to take it from the weakest part of the community and put it on the public as a whole. The distinction is one of method; the Germans accomplishing the result by compulsory insurance, the English by compulsory compensation.

The German system goes beyond the English in that it furnishes compensation in case of sickness. Its provision for sickness is separate, however, from its compensation for accidents; but, like the latter, is paid from a fund provided jointly by the employer and the employee.

So complete is the German system that each year compensation is awarded to something like 150,000 employees injured during the year, and to some 600,000 injured in previous years, and still totally or partially disabled. In addition, compensation is awarded yearly to some 65,000 widows and 100,000 children of dead accident victims. It is estimated that about 18 million workmen are protected by this form of compensation against the consequences of industrial accidents. About 2.70 per cent. of the wages paid by the Krupp Company goes into this insurance every year, of which nearly 2 per cent. is paid into an accident and over $\frac{7}{8}$ per cent. into a sick fund.

The compensation plan has within a few years passed over all Europe. It has been adopted in every country on the Continent and even in Australia, New Zealand, British Columbia and the Cape of Good Hope. In one form or another it is now in effect in 21 countries. It is only a matter of a short time, I believe, when it will be generally followed in the United States. In fact, the Federal Government has already put it it into operation in favor of its own employees. Massachusetts, Indiana and other States are on the verge of adopting it.

In Indiana the scheme is even now under consideration by a special commission. As in England, this commission proposes that a sum equal to the earnings of 3 years be paid in cases of death, and that medical expense, and at least half wages, be paid in all cases of disability. Unlike the English, but according to the German plan, it is proposed that the employer and the employee both contribute to the fund from which it is intended the payments shall be made. It is to be compulsory upon the employer that he provide at least one-half the fund. To insure proper management it is proposed to place the fund under State control. In all cases payments are to be made irrespective of the fault or negligence of the employee.

It is interesting to note that the development of this problem has been along the same lines in this country as in England. In the beginning both placed the risk of the employment and the negligence of the fellow-servant upon the workman; then both shifted these burdens to the employer; then England adopted the plan of compensating for injury regardless of the fault or lack of it on the part of the employee, and now this country is accepting that policy—in fact, has already adopted it in so far as the employees of the National Government are concerned.

Independent of official action, employers, with advanced ideas here and there throughout the United States, are providing compensation plans on their own account. In some instances a sort of joint insurance has been adopted to which the employer and employee both contribute. In others the plan has taken the form of a fund established by the employer out of premiums formerly paid casualty insurance companies. In each instance the effort has been to provide the injured with hospital and medical care; half or full pay during disability; often a pension for total incapacity, and not infrequently, in cases of death, an allowance to dependents equal to the earnings of the deceased for 1, 2 or 3 years.

The employers who are doing this are far-sighted and constructive. They are not only preparing themselves and the industries in which they are engaged for a condition that is rapidly coming upon them, but are adopting early the most scientific and humane plan yet proposed for dealing with this problem.

Wherever adopted the plan of compensation has given general satisfaction. It has proven the most equitable system that has so far been devised. It has in it elemental justice in that it compels each industry to bear its own cost in human life as well as in the wear and tear of machinery, a cost which in time will be so adjusted that it will fall upon the consumer and not upon the individual worker and his family, or even upon the individual employer.

Moreover, the adoption of this system has a tendency to develop safety appliances. It brings a fixed expense to every industry, and the effort to reduce that expense results in new methods for preventing injuries. It makes it profitable to think up new ways of avoiding accidents. Indirectly it emphasizes what the Germans learned long ago, that "Every life saved is a national asset."

It is said that a half million persons are killed and injured in industrial work in the United States each year. In 1905 more were killed and injured than on both sides of the Boer war in 3 years. About half the casualties in any industry occur to men under 40 years of age—that is, during the best period of their industrial lives. These figures show how near this question comes to the people. It is ever before them and with all the human interest that attends upon life and death. It is well, therefore, for the employer to stimulate his point of view; to look ahead and prepare for the future. The doctrine of liability is dying; it is giving away to a plan which compensates whether the injury is the result of the workman's fault or not. It is going out before a day which holds that as the Government compensates its injured soldier for his services to Government, so must the industry compensate its injured workman for his services to industry.

[Communicated.]

Some Notes From Abroad.

Although the writer spent only two days in London there is so much to note on every hand that is of interest that a few more words about the use of gas in the world's metropolis may be pardoned. The train shed of the New Victoria Station, which is illustrated in Fig. 1,

Fig. 1.—Train Shed, New Victoria Station.

shows part of the installation referred to in my previous correspondence.[1] One of the large markets is to be added to the list of buildings lighted by means of high pressure gas, so that it may be truly said that gas is not only holding its own but is increasing its already large lead.

The London Subway has three features which are different from the one in New York; there is a lack of speed and smell. And among the advertisements were those concerning Bray inverted gas burners, and gas coke for sale by the Gas Light and Coke Company.

A visit to London usually includes a trip to Windsor, especially if one is an American, and here we again find the lighting principally done by means of gas, as witness one of the monumental gas lamp posts at the entrance, as shown in Fig. 2.

Fig. 2.—Entrance to Windsor Castle.

The subject of ventilation is being discussed locally at home, due to certain ill-advised proclamations of more or less competent officials, and as the matter has been thoroughly aired here it may not be amiss to state that the subject is seldom heard of now, due to the fact that the officials in charge have made very equitable rulings which promote the cause of healthful living without unduly disturbing the equipments in buildings for light, heat and power.

After the bustle of London one is delighted with the peaceful toy city of The Hague and its neighboring seaside resort Scheveningen, the ocean walk of the latter being shown in Fig. 3.

Fig. 3.—Scheveningen, Holland.

Should a company employing a large force of men on mantle maintenance offer as a prize a trip to their most able workmen, I believe he would take off his hat to those who maintain the gas lamps in this quiet and conservative city. It is no wonder that the electric interests have to fight so hard to make a showing when every gas lamp burns as it would in a manufacturer's show window.

There are other things to tempt one to like the country, for a bath on the other side of the Atlantic bears no resemblance to either Atlantic City or Coney Island, especially the costumes of the fair sex.—Owens.

Burstall's Tar Extractor, with Suggested Revolution in Wet Purification.[1]

While the vertical retort is revolutionizing our ideas and practice in carbonization, Professor Burstall, of the University of Birmingham, is threatening to revolutionize our ideas and practice in the wet purification of coal gas. In present day practice this is carried out, in mort modern gas works, in hydraulic main, foul main, condensers and rotary washer scrubbers, with towers scrubbers frequently added. Now Professor Burstall proposes that all the plant after the foul main should be displaced by two pieces of apparatus that will go into the space occupied by a single rotary washer scrubber of average dimensions. And he supports his proposition by practical demonstration at the large Mond producer gas plant in use in connection with the Engineering Department of the University of Birmingham, of which department, as our readers are aware, Professor Burstall is the distinguished head. Professor Burstall has been, for many years, engaged upon a study of the gas engine, and one of the problems in connection with the practical application of the large gas engine has been how to thoroughly and economically free the producer or blast furnace gas, with which these large engines are fed, from liquid tar and suspended solid matter. His study of the gas engine naturally led him to tackle this problem of the cleaning of the gas, and having solved it in characteristically simple fashion, he has now designed a plant on the same lines for the complete wet purification of coal gas. This plant has not, as yet, been applied in a coal gas works, but a small cleaning plant has been at work in connection with the Mond gas plant at the University of Birmingham for the past 20 months,

1. See Journal, September 18, p. 714.

1. *Gas World.*

and a representative of *The Gas World* had an opportunity of inspecting it the afternoon of Monday, September 13, under the guidance of Prof. Burstall.

As, in the plant seen, what is known as the tar extractor is the most important feature, this may engage attention first. This piece of apparatus occupies only about the space taken by a 40-light meter, and yet it was seen thoroughly cleaning 30,000 cubic feet of gas per hour—cleaning it so thoroughly that a piece of white blotting paper held in a stream of the gas showed a barely perceptible stain. And this result is achieved in the simplest possible manner. The operative part may be generally described as a rapidly rotating wire brush, as seen in the sectional view (Fig. 1). Fig. 2 shows a perspective

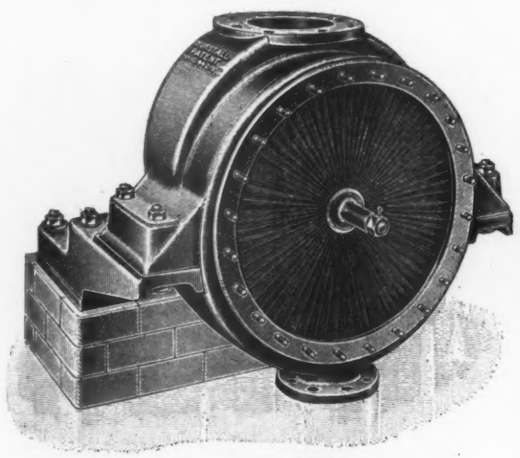


Fig. 1.—Burstall's Tar Extractor—Section.

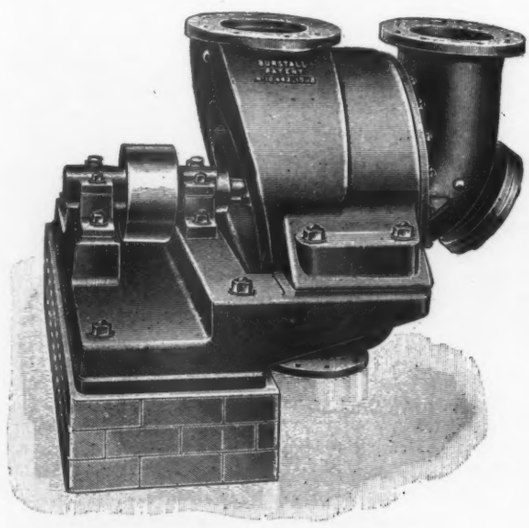


Fig. 2.—Burstall's Tar Extractor—Perspective.

view of the complete apparatus. The wires are fixed in a hub, row behind row, the wires in one row breaking joint, so-to-speak, with the wires in the next row, and the whole forming, in the small machine seen at work, a brush about 6 inches wide and 17 inches in diameter. The brush is rotated by an electromotor of about 5-horse power, at about 2,000 revolutions per minute, the speed at the periphery of the brush being somewhere about 10,000 feet per minute. The wires are about the thickness of ordinary knitting needles, and are made of steel. There is no attempt to make a close fit between points of the wires and the inclosing casing. This suggests the possibility of "slip," and that a considerable quantity of the gas must escape the brush; but, on closer inspection of the construction, it is seen that slip is entirely prevented by the arrangement of the gas outlet, which takes the form of an annular chamber, situated near the circumference of the casing, with the outer wall of this chamber overlapping the edge of the brush. Thus all the gas is compelled to pass through the brush.

Prof. Burstall describes the action of the brush in extracting tar from gas, as follows: "Any small particles of tar that are carried in with the gas are, during their passage through the extractor, brought into contact with one of the wires, which is already covered with a thin tar film. The surface tension of tar being high, the tar adheres to the wires until the thickness of the film becomes great enough for the centrifugal force to throw the tar against the casing, from which it is removed by a suitable opening," seen at the bottom of the illustrations. In practice, it is found desirable to admit a small trickle of water into the extractor, to assist in cleaning the wires, but it can be worked dry, is desired.

It may be asked, "How will these wires last, revolving at the tremendous rate mentioned?" The question was asked on Monday, and the answer was that the apparatus then at work has been in almost continuous operation for 20 months, and no repair has been required. Prof. Burstall is, however, at work with the object of determining the best material to use in the brushes when larger extractors come to be made. And in this connection the writer was shown an interesting demonstration. A brush made of a single row of wires was fixed in a rotating machine and rotated at the rate of 2,400 revolutions per minute. And the blast set up by this simple contrivance was remarkable, giving point to Prof. Burstall's suggestion that his tar extractor may not only displace the present wet purifying plant, but oust the exhauster as well. Fine sawdust run into the box in which the wheel was running was blown out with a "bite" that was absolutely painful to the hand. Nor did the wires become even warm; which indicates the volume of air which must have been passing over them.

Fig. 3 shows longitudinal and end elevations of a tar extractor designed to deal with 130,000 cubic feet of gas per hour. As the main dimensions are marked upon the drawing, nothing need be added here.

Before attempting a description of Professor Burstall's scheme for the complete wet purification of coal gas, reference must be made to another piece of apparatus seen in operation at the Birmingham University. This is even more beautiful in its simplicity than is the tar extractor, and it may be described in a few words. It is simply a cylindrical vessel filled with perforated plates strung upon a central revolving shaft. The perforations in alternate plates are near the center and at the periphery, respectively. Here again, there is no attempt to get a close fit between the plates and the inclosing cylinder, the necessary seal being secured by the centrifugal action of the rapidly revolving plates on the water contained in the cylinder. By the centrifugal action of the rapidly revolving plates, there is always a water seal between the peripheries of the plates and the wall of the cylinder, and, therefore, the gas, in its travel from one end of the cylinder to the other, is obliged to take a circuitous route through the cylinder—one moment at the center and the next at the periphery of a plate. As actually made, the central perforations (Fig. 4) are round, and the peripheral perforations are formed by merely cutting the metal and folding down, thus making a sort of wing, as indicated in Fig. 4. A small apparatus of this description was seen at work on a by-passed stream of Mond gas, so that the effect could be seen separate from that of the tar extractor, which was at work on the main stream. The washer, as this apparatus may be called, to distinguish it from the tar extractor, was taking a lot of tar out of the gas, as was proved, not only by the tar accumulating in the side well (Fig. 4), but also by a comparison of the gas before and after treatment in the washer. But it had not anything like the cleansing effect of the extractor. Apart, therefore, from the merits or demerits of Professor Burstall's scheme of complete purification, the tar extractor alone is worth the attention of gas engineers who are in search of an apparatus that will insure them tar free gas at the inlet of the dry purifiers.

In his system of complete purification, to which reference has been made in this article, and for which the drawings were seen by the writer—it is hoped a plant will be in operation soon—Professor Burstall proposes to use two of these washers (without the side wells, of course) in tandem, and to finish with a tar extractor. One washer might be sufficient, but with two a better temperature gradient can be secured. For instance, suppose the gas enters the first washer at a temperature of 130° F. It will leave that washer at 80°, and it will leave the second washer at 60°—it is a simple calculation, depending upon the quantity of cooling liquid employed. The washing liquid will be pumped from No. 2 washer to No. 1 washer, and the hot

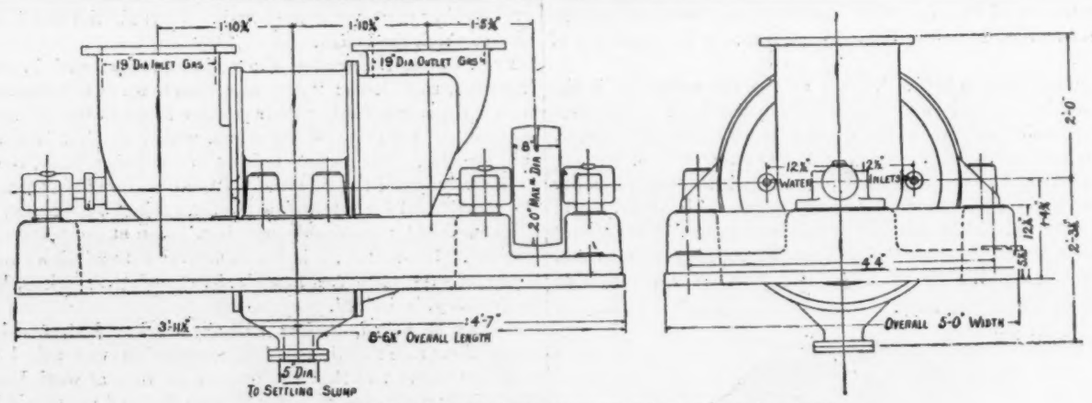


Fig. 3.—Burstall Tar Extractor Designed for 180,000 Cubic Feet of Gas per Hour.

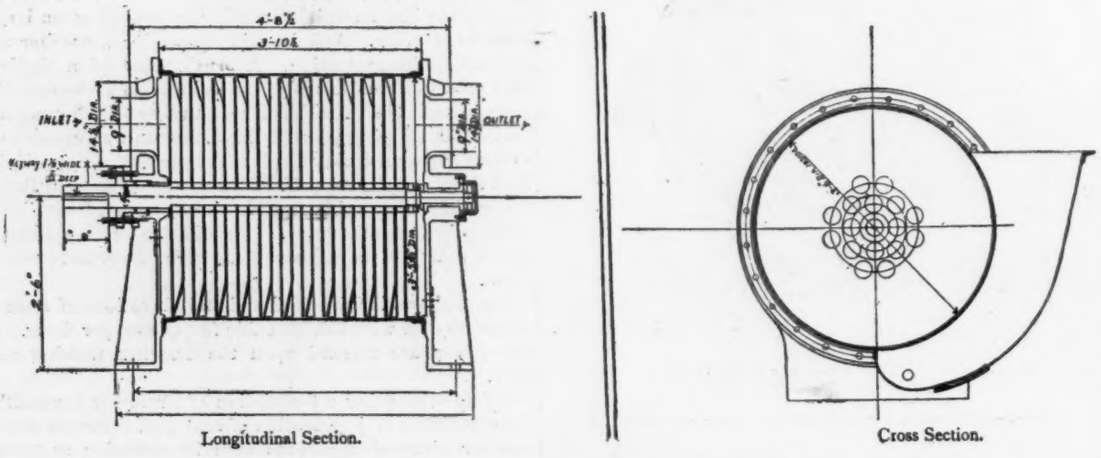


Fig. 4.—Burstall's Washer to Treat 30,000 Cubic Feet of Gas per Hour.

liquid from No. 1 washer will be pumped into an atmospheric condenser and pass from that to No. 2 washer. "It is easier to cool water than it is to cool gas," Prof. Burstall remarked, "and, therefore, I propose to cool water, not gas, in my atmospheric condensers." In this way all the ammonia and some tar will be removed from the gas, and by circulating the washing liquid, any desired strength of liquor can be obtained; within working limits, of course. In this application of Professor Burstall's washer it is not proposed to drive the washers at a higher rate than, say, 50 revolutions per minute. Then the last traces of tar will be taken out of the gas by the rapidly rotating tar extractor.

A plant of this description, as designed to treat 30,000 cubic feet of gas per hour, will have the following dimensions: Washers (each), 3 feet 6 inches in diameter and 3 feet 6 inches long; tar extractor, 2 feet 10 inches high, 3 feet 9 inches long and 3 feet 7 inches wide.

In these notes an endeavor has been made to present clearly and fairly what was seen at Birmingham University, and to set out the aims of Professor Burstall.

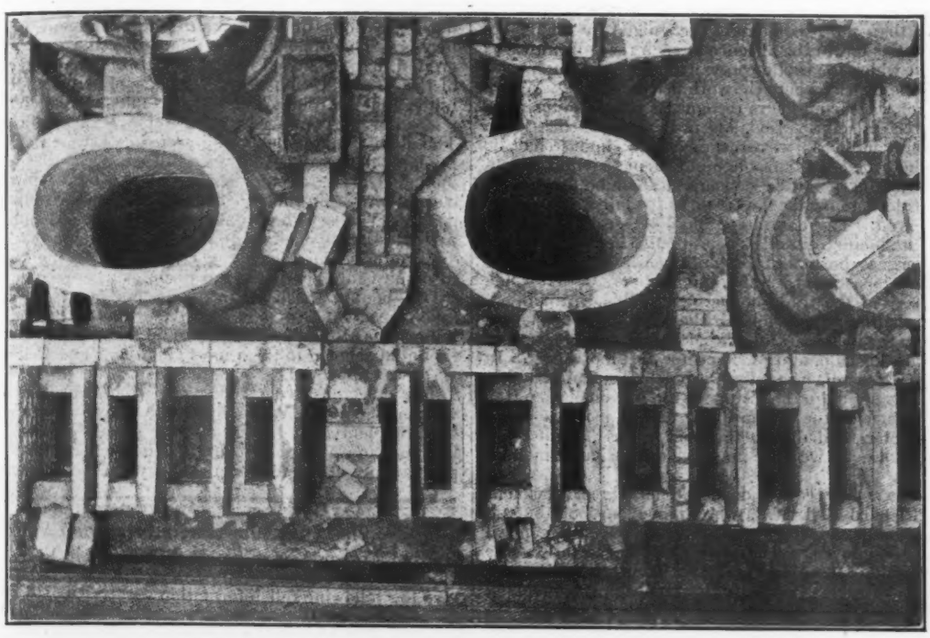
A 40-Retort Installation of Woodall-Duckham Vertical Retorts at Kensal Green.[1]

At the Kensal Green works of the Gas Light and Coke Company, the largest installation on the Woodall-Duckham continuous vertical retort system yet erected is now nearing completion, and the settings will be ready to commence the production of gas by the middle of November. Very shortly afterwards the installation of settings now being constructed for the Burnley Corporation will be commencing manufacturing operations, and this will only be short of the size of the Kensal Green installation by a single setting of 4 retorts. But this week attention is confined to the Kensal Green plant, which is the result of the excellent experience with the comparatively small trial installation that has been in operation now for some time at the Nine Elms station of the Gas Light Company, and the working of which has been keenly followed by the Company's Chief Engineer (Mr. T. Goulden) and the Works' Engineer (Mr. T. S. Lacey). There need be no stronger testimony of the views formed, by direct experience, by Mr. Goulden as to the Woodall-Duckham automatic system of continuous carbonization than this larger installation of 10 settings of 4 vertical retorts, which it was our pleasure to inspect in their nearly complete stages last week. If any finishing touch be required to the evidence already accumulated as to the successful working of the system, this Kensal Green installation will give it; for the auxiliary plant allocated to the new producing plant will represent in effect a complete gas works from carbonization to metering and storage. In this way, there will be no loophole for inaccuracy, and the scope for definite and reliable tests will be as broad and wide as it is possible for it to be. And of this we may rest assured, that the Works' Engineer (Mr. A. S. Baker) will not leave a stone unturned to find the full worth of the system from the plant that it is his privilege to have placed under his charge.

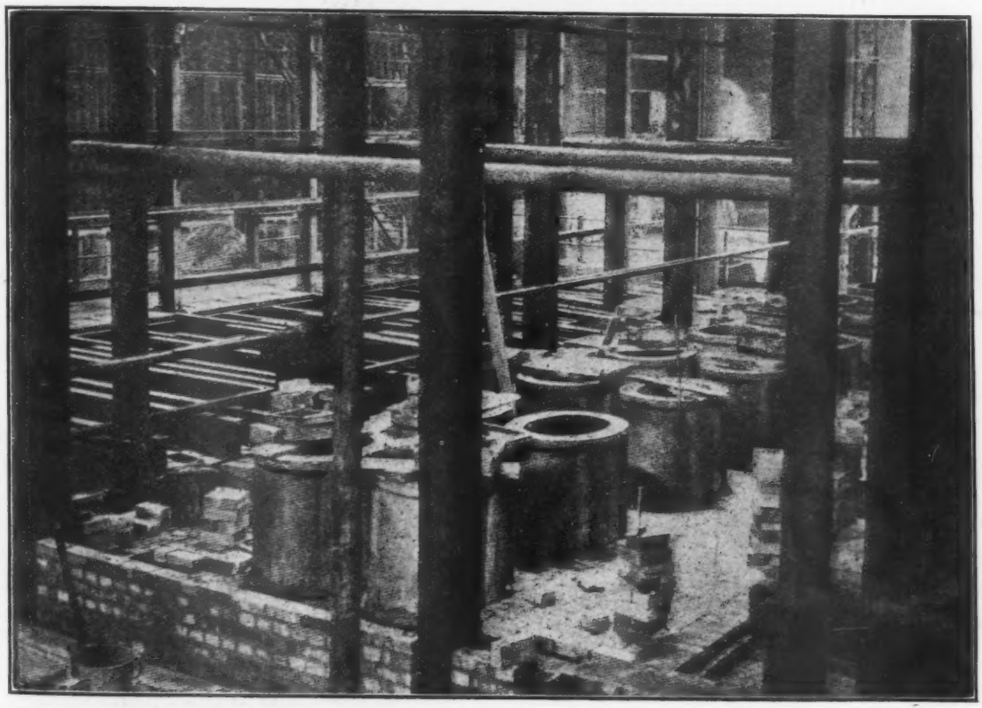
Roof Alterations.—The new plant occupies a part of one of the old retort houses at the station. The only alteration to the house that was needed for the benches was to the roof, a portion of which is carried by the buckstays of the new settings. Partly to this roof alteration is due the arrangement of this first installation of vertical retorts in two lines—that is to say, five settings in each row—as the scheme for carrying a part of the roof off the buckstays could not have been effected had the settings been constructed in a single line, and it is naturally the desire of the Company's advisers to, even in the larger installations, proceed tentatively. The walls of the house have not had to be raised at all, and the roof itself, or rather the ridge of the roof, is very little higher than it was before—indeed, practically all that has been done is to make more room between the principals. Not much work was occasioned by this. The old roof was stripped, and the new arrangement of roof sets on the same bedplates as before.

The Settings and the Ground Space Occupied.—The retort house is 65 feet wide, and the part of the ground now occupied by the Woodall-Duckham settings had previously upon it a central bench of five settings of nine horizontal retorts. The same ground space is now tenanted by the ten settings of four retorts, arranged in two parallel blocks of five settings, with a central space of 9 feet between them, and there is still a good margin of working room round the

1. *Journal of Gas Lighting.*



Plan on Section Length of Woodall-Duckham Settings at Kensal Green.



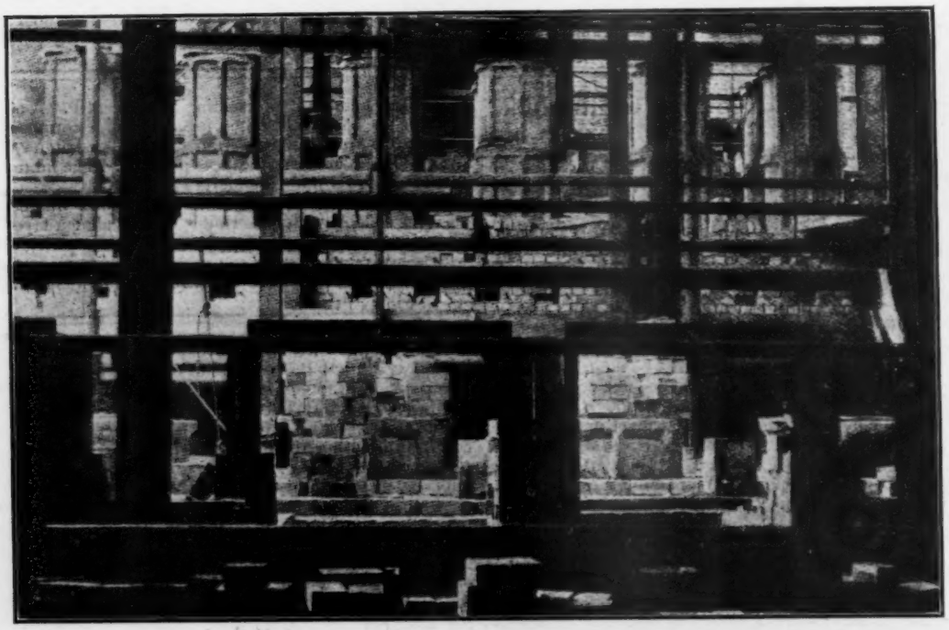
Elevation of the Bottom Length of the Kensal Green Settings.

settings. So that, with the new compared with the old, the economy of space is considerable. As a matter of fact, the producing capacity of the ten vertical settings will be 1,250,000 cubic feet of gas a day, which is double that of the settings displaced. The point need not be labored to show its importance where a site is circumscribed and there is no spare room for extensions on the old system.

The length of each bench of five settings is 55 feet. The settings are 10 feet centers, and the depth from front to back between the buckstays is 17 feet 6 inches. The whole of the settings and the producers are carried 9 feet above ground level (at Nine Elms the latter are at ground level) on a bed formed of 14-inch by 6-inch rolled steel joists, with concrete filling. The buckstays not only serve as binders to the settings and producers, but they also carry the coal hoppers, conveyors and roof. The whole of the upright and girder work is of substantial character. The height from ground level to the top of the retorts is 35 feet, and from that point to the top of the coal hoppers 12 feet; so that the over-all height (including the 9 feet clear below the settings for the discharging operations) is 47 feet.

The forty retorts comprising the installation are 25 feet long, and 21 inches by 9 inches at the top, expanding to 29 inches by 20 inches at the bottom. The combustion chambers are situated round the top 5 feet length of the retorts, and access to each chamber is obtained by manholes in the front of each. The gases descend from there to the bottom of the settings—the hottest part of the retort being at the top where the coal enters, and the temperature declining to the bottom of the retort. As previously mentioned, the producer is raised above the ground level, and the back wall of the producer now forms one of the side walls of the setting. The regenerator is located in the wall on the reverse side of the settings. Each bed has a separate generator and chimney, the latter being rectangular in section to within a few feet of the roof, and then continued through the latter by a circular extension. The regulation of the heat to the settings is accomplished by dampers on the hot secondary air and primary gases just before they meet at the nostrils. There are four sets of nostrils situated just below the combustion chamber level, and the gases are mixed in a chamber just before reaching the retorts. The regulation of the heats with these settings is an extremely simple matter, and it has not been found that the temperatures vary, or that they require special watching.

Coke Extraction.—As is well known, in the Woodall-Duckham system the whole of the coke discharging is accomplished mechanically, and as upon the speed of discharge depends the rate of travel of the coal through the retort, we will briefly refer to the coke extracting part of the setting before dealing with the charging device. The principles of the apparatus for the extraction of the coke are the same as are incorporated in the plant at Nine Elms; but an improvement has been effected, in that the discharging apparatus is perfectly gas-tight and is more readily accessible for cleaning purposes. Running generally over the coke extracting apparatus. At the bottom of each retort (and each retort by the way is a separate entity from the feed to the dicharge) is a cast iron hopper with one side sloping, which side takes the weight of the charge in the retort. At the bottom of the slope is fixed a wheel with helical blades, which, as it revolves, discharges the coke in small quantities from the retort into the hopper beneath. This hopper is in the form of a faced drum, which receives the coke, and in its turn automatically dischares it into barrows or conveyors. The speed of the extractor is 1.2 revolutions per hour, while the discharging drum makes over 5 revolutions an hour. The extractor speed is variable at will, and the speed to which it is set governs the rate of carbonization. There is one point upon which there appears to be some little doubt in the gas profession, and that is as to the power required to operate the extractor roll. There need be no question regarding this. The pressure of the coke on the extractor is, indeed, so small that it can be easily operated by hand, as well as by any machine. Standing under the retorts, it is interesting



General Elevation of the Kensal Green Settings.

General View of the Two Blocks of Settings Under Construction.

to see the four lines of 10 coke hoppers, with their discharging drums. They are strongly built, the drums fit true, and, wherever one looks it is noticed that strict observance of the correctness of every detail has been a feature of the erection.

The installation includes a gas-driven electricity generating plant, and each block of settings will have its own 6-horse power electric motor for driving purposes. A shaft is supported by brackets on the main uprights, and to this the extractors and discharging rolls are connected by gearing.

Accessibility.—Proceeding from the ground level, it must be said, in passing, that we like the ample and safe provision made for reaching all parts of the settings. Strong stairways, with chequer plate treads, lead from platform to platform. The first reaches to the clinkering platform at the 9-foot level (with the outer side railed in) for the two blocks of settings. The platforms are also floored with chequer-plates. On the producer sides, hinged doors are provided in the platform (in range with the clinkering doors), through which the clinker can be deposited direct into trucks at the ground level. From this platform a second stairway leads to the producer charging floor, and a third similar stairway carries one up to the retort feeding floor.

The Coal-Feeding Arrangements.—On the top of the benches little is found that is different from what has been previously described in connection with the system and the smaller installations of the plant. The retorts are finished with cast iron mouthpieces, to which are attached the rotary drum feeding devices and the gas take-offs. The feed of the coal, as explained earlier, is entirely controlled by the extraction of the coke, and the speed of the feeding rolls is so regulated that they always contain some 50 per cent. excess of coal beyond requirement—that is to say, they really run just twice too fast. A ratchet drive operates the feeding devices, the power being supplied by the electrical plant referred to when dealing with the coke extracting arrangements. The top feeding devices and the bottom discharging drum being mechanically actuated, makes the process completely automatic. Before leaving these features, it may be added that a continuous foul main runs down each side of each setting, and connections with a screw-down valve are made to these from each retort.

Above the retorts are the coal hoppers, to carry 16 hours' supply. Shoots from these hoppers direct the coal to the feeding arrangements. The coal is raised to the hoppers by a bucket elevator (with breaker at the foot) situated at one end of each block of settings, and it is distributed to the hoppers by push-plate conveyors running between them (there being two hoppers to each bed), so there is one conveyor to each block of 5 settings. The plant is all so designed that it will deal with a second series of 10 settings, for which room has been left at the end of the house. These two blocks of retorts 40 in all—have a guaranteed minimum carbonizing capacity of 2½ tons of coal per retort per day, or in the total 100 tons; but the figures from actual working that have been published from time to time in our columns show that this minimum guarantee is materially exceeded. And in regard to labor, when coke conveyors are introduced, 3 men per 8-hour shift will be sufficient to deal with the installation, producing about 1,250,000 cubic feet of gas per day. This surely will bring carbonizing wages down to somewhere about the irreducible minimum.

There is not a great deal more work to do in connection with the installation, which will in a few weeks be in operation—in fact, before many days are over part of the settings will be under slow fire. Looking at the structure superficially, there is all the evidence about it that it has been carried out with an eye to efficiency, durability, and smooth automatic operation. From an installation on such a scale we shall look for results that will in every way be confirmatory of those published in respect of the working of smaller installations.

THE Tacoma (Wash.) Gas Light Company has filed notice changing the incorporated title thereof to that of the Pierce County Gas Company.

Heat Conductivity of Firebrick.

[A paper prepared by MR. V. F. DEWEY, for the 17th Convention, Michigan Gas Association.]

As an introductory remark I cannot do better than refer your attention to a paper, written by Frederick J. Bywater, of Birmingham, England, on "Refractory Materials." The full text of the paper is in the June 23, 1908, number of the *Journal of Gas Lighting*. The paper covers, in a very creditable and satisfactory manner, the: Origin of fireclays; composition of fireclays; composition of firebricks; practical testing of refractory materials, and the design and selection of refractory materials.

I do not consider, however, that the subject of refractory materials has been fully covered without considering the heat conductivity of firebricks; the variation of heat conductivity at different temperatures; the specific heat and the specific gravity of firebrick and the physical and chemical characteristics that determine the heat conductivity. So far as the writer has been able to determine, little has been published on the above points. Experiments have been made by the writer and his associates that cover the subject, in a limited way at least. Some data have been obtained that bear out the generally expressed notions on the above points; but in all cases they do not so agree.

As a preliminary step, it was necessary to design and build an apparatus for determining the heat conductivity of firebrick. The design of the apparatus, after a number of trial tests and changes, is shown in Figs. 1 and 2.

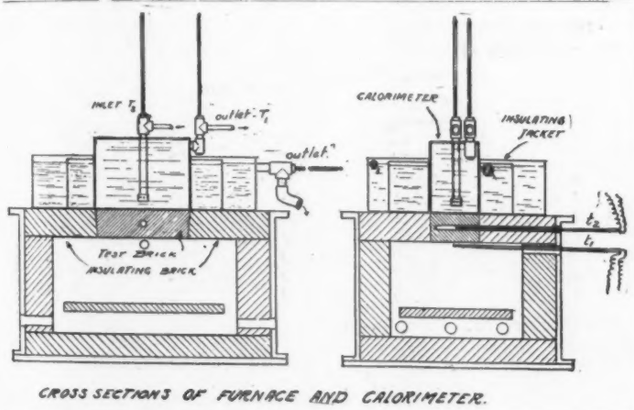


Fig. 1.

The apparatus used is a square gas furnace with a firebrick top, the "test brick" being in the center of the top. Over the test brick is the calorimeter. Surrounding the calorimeter, and over the firebrick surrounding the test brick, is another water tank. By keeping the water in the surrounding tanks at the same temperature as that in the calorimeter, the transfer of heat through the firebrick top would be quite uniform and would give us a minimum of danger of heat transference from or to the test brick from the surrounding firebrick; t_1 represents the temperature of bottom of test brick; t_2, the temperature at measured distance from bottom of test brick; T^1, temperature of the outlet water; T^2, the temperature of inlet water to calorimeter.

The heat conductivity was estimated in gram calories per second per square centimeter per centimeter of thicknesss per deg. C. difference in temperature, and was calculated from the following formula:

$$k = \frac{\text{liters water per 10 minutes} \times (T^1 - T^2) \times .01823}{t_1 - t_2}$$

See addenda (1) for full explanation of formula. K in table No. 1 is the British Thermal Units per square foot per degree difference in temperature F.° per hour, per inch of thickness.

TABLE NO. I.

Sample No. Brick.	Range in Temp. Degs. F. t_2	t_1	Heat Conductivity. (k)	(K)
1	1,221	2,081	.00322	9.344
2	1,181	2,071	.00229	6.65
3	1,175	5,100	.00237	6.88
4	1,395	2,090	.00729	21.15
5	1,367	2,133	.00275	7,98
6	1,210	2,096	.00326	9.47
7	1,048	2,104	.00511	14.82
8	1,185	2,088	.00326	9.47

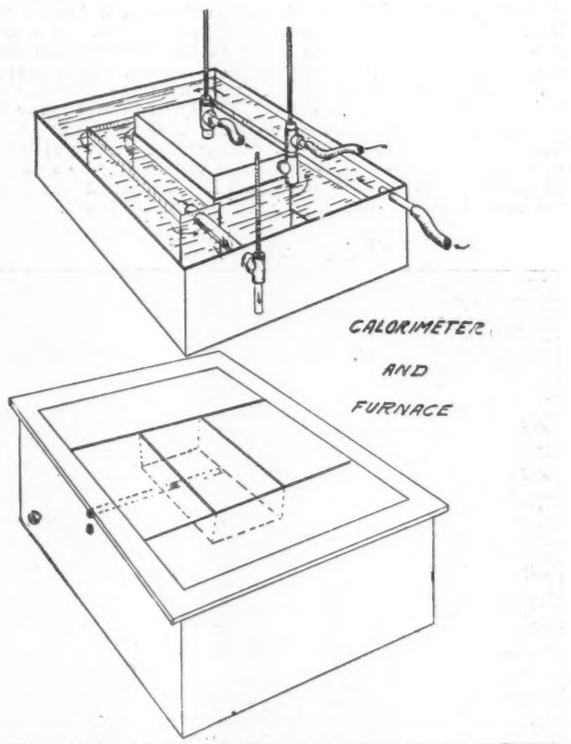


Fig. 2.

Quoting from *The Gas World*:

"The Societe d'Encouragement pour l'Industrie Nationale commissioned M. S. Wologdine to investigate the conductivity of fireproof material. He has found that all clay pastes, moderately fired, whether refractory or not, have much the same conductivity for heat, .003; very hard refractory bricks, .0045; silica bricks, much the same as clay bricks; carborundum and graphite, .015."

Joseph W. Richards, in his book, "Metallurgical Calculations," gives—

Firebrick 32° F. — 2,372° F. — .0031
" 32° F. — 932° F. — .0014

The Harbison-Walker Refractories Company gives the following information regarding its product:

"The relative heat conductivity of our different kinds of refractory materials is shown below. The figures shown are the number of minutes required to conduct heat from an inclosed Bunsen burner through 4½ inches of firebrick to melt paraffine."

1st quality brick, medium grind, hard burn, 48 minutes,
1st quality brick, coarse grind, light burn, 39 minutes.

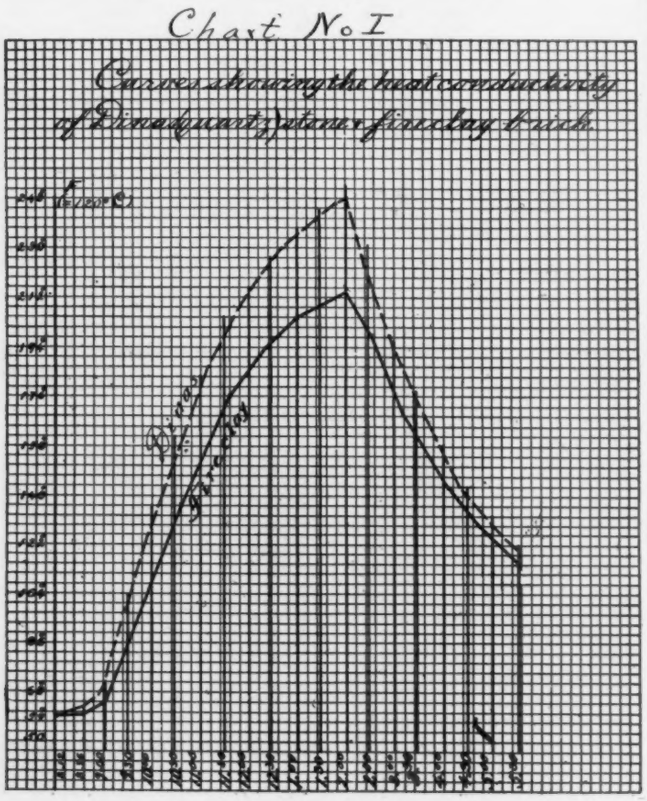
Quartzite	45	minutes.
Silica brick	39	"
Chrome brick	32½	"
Magnesia brick	17½	"

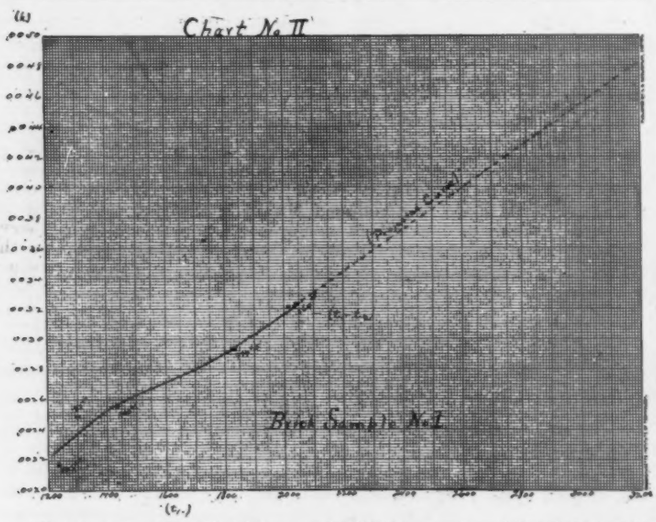
Also, quoting from a paper by Dr. Fritz Lesisse, Chemist of the Cologne Gas Works, on the subject of "Fireclay and Dinas (quartz) as Material for Retort Benches:"

"For the lining of smelting furnaces for steel and glass, materials of an acid nature, such as quartz, have been used with great success." This led manufacturers in England to use a complex silicate of aluminum which contains about 95 per cent. silicon dioxide, 2 to 3 per cent. aluminum oxide, to which is added iron oxide and 1 to 2 per cent. calcium oxide. The name of this quartz stone is "Dinas." It is found in various places in England. Its heat resistance is, as a rule, higher than that of good, basic fireclay material. Its main characteristic is the fact that it does not shrink but expands when exposed to high temperature. This is caused, most probably, by its structure changing from a crystalline into an amorphus form. This expansion amounts to 1 to 3½ per cent., causing a slight weakening of the bricks in high heats.

In using Dinas stones the settings keep their forms after the stones have expanded in the outset; therefore, the pillars and buttress walls can be reduced in thickness, which again results in larger spaces around the retorts and higher heats in these parts of the setting. The disadvantages by softening and shrinking do not occur with the Dinas stones, notwithstanding their more porous structure, as was evident from the appearance of these stones, which, after 2 years' use,

showed as good and almost as white surfaces as in the start; whereas, the fireclay bricks had molten and glassy surfaces. In a setting with fireclay bricks, the supports of the retorts show off when the bench is fired up as dark strips across the retort bottom, which disappear only when full heats are reached. Not so with the Dinas, which show only the first day and then very slightly, the heats rising better and the retorts keeping higher colors than those in the fireclay settings. The better heat conductivity of the new stone material has been ascertained by a series of comparative tests, the results of which are plotted down in the diagram, Chart I. The dotted line representing the Dinas is 20 per cent. higher at the maximum heat.





The stone was small side up, imbedded in sand and insulated at the top by asbestos, 3 holes with different depth serving for the thermometer readings. The decrease in the rise, about 194° F., is caused by the radiation which then sets in. The better heat conductivity is also shown by the more abrupt falling off of the Dinas curve after the source of heat has been removed, the stone giving off quicker to the environs the heat stored in it.

A great number of such tests showed the conductivity to be about 20 per cent. better than that of the best fireclay bricks of closer grain. It will be even higher in the retort settings because the loss by radiation is less than in the experiments.

The quotations from Harbison-Walker Co.'s letter, and also from Dr. Leisse's paper, show that thermometrical and calorimetrical heat conductivity have been used synonymously. There is, of course, a very marked difference between the two; the first is a transference of temperature; the second, a transference of heat. The transference of temperature will be the more rapid the lower the specific heat and the higher the heat conductivity. If, however, one of two substances be actually a better heat conductor than the other, and yet the second have a proportionately smaller specific heat, it may be that the time required for a given temperature to reach a given distance may actually be less in the poorer conductor. Tyndall placed two cubes, one of bismuth the other of iron, whose up-surfaces were coated with wax, upon the top of a heated plate. The wax melted soonest upon the cube of bismuth, yet the heat conductivity of iron is several times that of bismuth. The specific heat of bismuth is very much lower than iron.

Thermometrical conductivity is the ratio of calorimetrical conductivity to the specific heat of unit volume. Inasmuch as the usual silica brick has considerably lower specific heat per unit of volume (about 20 to 25 per cent.) than ordinary firebrick material, one can easily understand how the misleading and erroneous results (as above quoted) were obtained.

Experiments on the variation of heat conductivity at different temperatures were made only on brick sample No. 1.

TABLE No. II.

Range in Temp. t_2 t_1 Degs. F.	Difference in Temp. t_1 t_2 Degs. F.	Heat Conductivity. k.
730	1,233	503	.00218
713	1,296	583	.00249
834	1,536	702	.00256
1,062	1,836	774	.00293
1,221	2,081	860	.00322

No experiments were conducted at temperatures higher than 2,081° F., with a differential temperature of 860° F.; but it would seem probable that (k) at 3,000° F. and a differential temperature of 1,300° F. would be about .0046, or an increase of over 40 per cent. Whether or not the above would hold good on a material of a different composition, specific heat and specific gravity is, of course, problematical. It is reasonable to suppose that it would. The following are some data on the specific gravity and specific heat of firebrick:

TABLE No. III.

Brick No.	Range in Temp. Degs. F.		Specific Gravity.	Specific Heat Per Unit of Weight.	Specific Heat Per Unit of Volume.
1.....	80	2,115	2.15	.262	.5633
2.....	"	2,042	2.01	.252	.5065
3.....	"	2,098	2.03	.264	5359
4.....	"	2,101	2.94	.293	.8614
5	"	2,111	1.69	.262	.4428
6.....	"	2,085	1.70	.234 (?)	.4078 (?)
7.....	"	2,038	2.42	.291	.6042
8.....	"	2,097	1.90	.253	.4807
9.....	"	2,100	2.09	.273	.5706

The specific heat of No. 6 is under question, due to the breaking of the sample when being placed in the furnace.

The analyses of the different samples of brick are as follows:

TABLE No. IV.

No. of Sample.	SiO_2.	Al_2O_3.	Fe_2O_3.	Na_2O and K_2O.	CaO.	Ti.	Mg O.	Manganese.
1..	63.89	31.44	1.99	0.76	0.72	1.20		....
2..	62.05	36.34	trace.	....	0.43	....	0.18	....
3..	59.60	34.69	3.45	. ..	0.97	....	0.53	trace.
4	1.75	0.78	7.85	....	4.01	....	85.25	0.65
5..	94.80	1.49	0.87	0.63	1.94	....	0.27	....
6..	94.84	1.09	0.91	1.24	1.72	....	0 20	...
7..	4.00	1 85	4.53	0.62	2.04	....	86.96	trace.
8..	95.92	1.61	0.49	. ..	1.66	....	0.22	....
9..	59.94	34.50	3.89	....	1.38	....	0.38	trace.

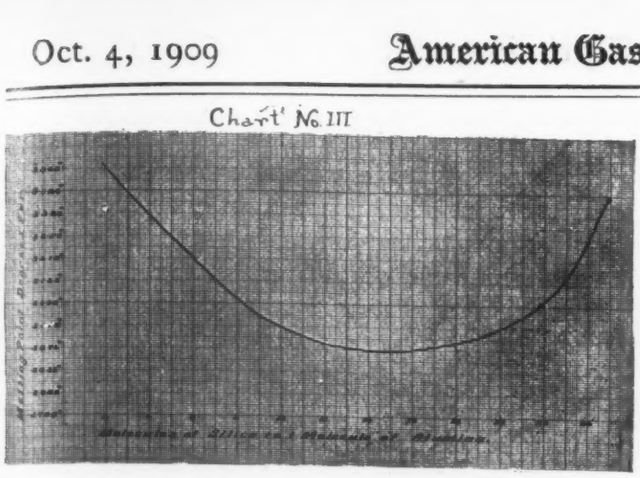
It would seem that the percentage of silica had little to do in determining the heat conductivity of firebrick; that Mgo in firebrick had very much to do with its heat conductivity, and that the heat conductivity increased with the density and specific gravity of the firebrick. The practical application of the data obtained, and much more along the same lines, would be of immense value in the proper choice of firebrick material used in the manufacture of gas.

Gas Benches.—(1.) Furnace lining should be made of any first-class material that will stand the heat in the furnace and not flux with the ash in the fuel used. Nos. 1, 2 and 3 represent a class suitable. Materials in this class are not expensive.

(2.) Furnace arch and setting blocks should be of a material that will stand very high temperature, considerably over 3,000° F., without shrinkage under load. A slight expansion under heat would not be injurious, as provision can be made for this when erecting the bench.

The following chart is taken from Mr. Bywater's paper and graphically shows the material that answers the above requirements is either a very high grade and high percentage silica, or Al_2O_3. A brick very high in Al_2O_3 will stand high heats, but it has a decided tendency to shrink, and keep on shrinking, under high heats. If silica is used it would seem that the silica content should not be less than 94 per cent. Nos. 5, 6 and 8 represent this class, No. 8 being best on account of its higher specific gravity and specific heat per unit of volume.

(3.) *Retorts.*—The first requirement of a material for a retort is ability to stand fairly high heats and keep its shape. Second, heat conductivity, Nos. 4 and 7 represent a class—No. 4 being much the better, that would seem to afford a splendid field for obtaining maxi-



mum results. I am not aware that magnesia material has ever been used in bench construction. It is very high priced. It expands on heating, and it would, therefore, be necessary to make segmental retorts out of this material. (Silica material is being used for this purpose with considerable success.)

(4.) *Recuperators.*—On account of the height of the furnace necessary to make a first-class producer, it would seem that the ordinary fireclay material used in such construction would offer sufficient opportunity for the recovery of all the waste heat that the secondary air is capable of taking up.

(5.) *Front Wall.*—(a) Below the combustion chamber, ordinary (first-class) firebrick; (b) above the combustion chamber:

(1) Inside course silica brick or any brick that will stand considerably above 3,000° F.

(2) This could be backed up by less expensive fireclay brick, and a layer of 1 inch of loose asbestos could be put in just inside of the outside course.

The above suggestions on bench construction are applicable to a bench designed for continuous operation with the heats around the retorts of 3,000° F. or more.

Water Gas Firebrick Material.

(1) *Generator Lining.*—Same as coal gas furnace.

(2) *Carburetter and Superheater Lining.*—Fireclay brick of as low a heat conductivity as possible. Nos. 2 and 3 are representative samples.

(3) *Checkerbrick.*—A close-grained fireclay brick with the highest specific heat per unit of volume possible. Should be able to stand rapid changes in temperature without cracking. The higher the heat conductivity consistent with the above qualifications, the better.

Addenda (1.)

Conductivity was estimated in gram calories, per second, per square centimeter, per centimeter thickness, per degree C. difference in temperature, and was calculated from the following formula:

$$k = \text{liters water per 10 min.} \times \frac{(T_1 - T_2)}{t_1 - t_2} \times .01823$$

which was derived as follows:

T_1, T_2 = temp. outlet and inlet water, degs. F.
t_1, t_2 = furnace and center of brick temp. degs. F.
Liter = 1,000 grams.
10 min. = 600 seconds.
1¼ inches = 3.18 cms.

Area of calorimeter:
45 square inches = 290.34 sq. cms.
Temp. conversion factor = 5/9 = f.

k = grams water × $(T_1 - T_2)$ f × cms. thick; time in seconds × area of calorimeter × $(t_1 - t_2)$ f. f cancels out.

$$k = \text{liters water per 10 min.} \times \frac{(T_1 - T_2}{t_1 - t_2} \times F.$$

F = 1 liter × cms. thick.
time in seconds × area of calorimeter in cms.²

$$F = \frac{1{,}000 \times 3.18}{600 \times 290.34}$$

F = .01823

$$\therefore k = \text{liters water per 10 min.} \times \frac{(T_1 - T_2)}{t_1 - t_2} \times .01823$$

[Special Correspondence.]

THIRD ANNUAL CONVENTION OF THE ILLUMINATING ENGINEERING SOCIETY.

Once in a generation New York becomes enthusiastic, and one of those spells was upon it when the Third Annual Convention of the Illuminating Engineering Society was called to order the morning of Monday, September 27, in the United Engineering Society's Building, New York city, just 2 days after the opening of the Hudson-Fulton ceremonies. Needless to say, this latter will long be remembered for its lighting effects rather than those of any other feature.

Unfortunately the New York members were so taken up with work on the celebration that they were not much in evidence at the first session, which the Chairman of the Convention Committee, Mr. E. L. Elliott, opened shortly after 10:30. The visitors were made welcome by Mr. T. C. Martin, who aptly stated that, while Paris was the city of light in the old world, New York was the city of light in the new, and Dr. Louis Bell, who responded to the welcome, said it took New York a good while to wake up, but when it did awake, it did so with redoubled enthusiasm.

President Gartley, in his Address, referred chiefly to visual perception, and his remarks will bear careful consideration. Regarding the position of illuminating engineering, he said that the fact that some 250 million dollars for lighting were spent each year in this country would seem to be an answer to the query as to the need for work along the lines which the Society was following. We needed further, however, the aid of the trained physicists in our colleges, and such interest as they have already taken spoke well for the future.

In presenting the report of the Committee on Nomenclature and Standards, the Chairman, Dr. A. C. Humphreys, spoke briefly of the work in hand, and deferred to the Chairman of the Sub-Committees for the detailed reports.

The report of the sub-Committee on "Unit of Light" was presented by Dr. E. P. Hyde at the request of the Chairman, Dr. Bell. Dr. Hyde reviewed briefly the work accomplished toward the adoption of the international candle, extended references to which have been made in the Journal.

Considerable discussion, especially in Germany, has been had concerning the adoption of an international unit, but without an international standard with which to make a comparison, and in this connection Dr. A. H. Elliott stated he had taken personally six carbon filament electric lamps to the Electrical Testing Laboratories in New York City, The Bureau of Standards at Washington, the Official Laboratories at London and Charlottenburg, and back to Washington and, although the final figures were not available, the results showed a much better agreement than he had anticipated. Dr. Rosa called attention to the fact that the International Photometrical Commission would meet in Zurich next year, and as yet America had no representative, although England, Germany and France had several.

The other report referred to by Dr. Humphreys on "Photometric Units," was presented by Dr. C. H. Sharp, the Chairman, but not in final form, as some of the minor details had not been decided by the Committee. He said that the proposals were based upon the, we might say, celebrated work of Dr. Blondel. The unit of luminous flux will undoubtedly be unit, solid angle or steradion $\left(\frac{1}{4\pi} \times \text{M.S.C.P.}\right)$

Drs. Kennelly, Bell and Hyde spoke in favor of the C. G. S. system of measurements being adopted as they were already international in character. Dr. Rosa said that if we would give up the foot and adopt the meter, the Germans would be likely to give up the Hefner in favor of the candle. [Laughter.]

After further discussion by Messrs. Gartley, Marks and Bond, the subject was closed.

The Secretary announced that a number of invitations had been received (among which were those of the Consolidated Gas Company and the New York Edison Company) to visit various works; also, from the American Society of Mechanical Engineers to visit the historical exhibit on the Hudson-Fulton celebration.

After reports from the Chairmen of the Committees on Entertainment and Exhibits (Messrs. Marshall and Elliott) the meeting adjourned.

First Day—Afternoon Session.

Although the day opened with cloudless skies, by afternoon it began to rain, so that the attendance at the second session was not what it should have been. President Gartley called the meeting to order promptly at 2:30, and introduced Mr. E. L. Elliott, who read his paper on "The Ethics of Illuminating Engineering." This will serve as an excellent basis for a code which could well be adopted by the Society. In the discussion, Mr. Marks stated that, although a college education was desirable, it was not essential, and that an engineer could accept a retainer from manufacturers of appliances and also do consulting work.

Mr. Campbell described the practice of basing the fee upon the saving on lighting bills, and hoped that the practice would be frowned upon.

Mr. Calvert thought the advice given by lighting companies was tending to encroach upon the work of regular practitioners, and in reply Mr. Owens stated it was fortunate the lighting companies took an interest in the subject, as any increase in the number of good installations would greatly aid all concerned.

Mr. Macbeth said that the greatest trouble so far experienced was from salesmen who were pushing their wares under the guise of illuminating engineers.

In closing the discussion, Mr. Elliott said that any advice given by an engineer interested in a certain appliance should be confined to that particular system and not include any others, as he was manifestly unable to give impartial advice in the latter case.

The second paper was presented by Mr. Geo. S. Barrows, on "The Work of Dr. Carl Auer von Welsbach in the Field of Artificial Illuminants." Although his work is well known in gas circles, it is indeed of importance to bear retelling, as 1886 marked the birth of a new era in gas lighting.

Dr. Simonini, who had been associated with Dr. Auer, spoke briefly of the great work which had been accomplished.

Dr. A. H. Elliott stated that his work on sparking alloys had already borne fruit, as they were being used in Germany for gas lighting.

Dr. Myer said that, as early as 1906, some 400 tungsten lamps a day were being made for commercial use in Dr. Auer's Vienna factory.

Dr. Sharp called attention to the fact that the two great modern systems of illumination (incandescent gas and electric lighting) were one-man systems—Dr. Auer's and Mr. Edison's.

Dr. Bell referred to Dr. Auer as one of the greatest and one of the least recognized of research chemists.

The paper on "Progress of Illuminating Engineering in Europe" was then read by Mr. H. Thurston Owens.

The author described the work which led up to the formation of the British Illuminating Engineering Society, and then covered the practical side by comparing the lighting conditions abroad with those at home.

In discussing the paper, Dr. A. H. Elliott agreed most heartily with the author regarding the matter of maintenance, and hoped that both gas and electric companies would give the matter greater attention.

Mr. Barrows stated that he did not believe America was so far behind Europe, especially in electric lighting, and that, as far as high pressure gas lamps were concerned, the American manufacturers have been ready for some time to supply the demand, but that the field was covered by electric arc lamps.

In closing, Mr. Owens stated he hoped Mr. Barrows would be fortunate enough to visit Berlin and see the results obtained with the latest designs of electric lamps. Regarding the high-powered electric lamps, which Mr. Barrows claimed were so good, these should be displaced by either newer types of electric or high pressure gas lamps, as they have been abroad.

The next paper was entitled "Diffusing Mediums, by the Consulting and Designing Illuminating Engineer," by Mr. A. J. Marshall; but the author was apparently at a loss to decide which were the important points, so he did not read any part of it.

Mr. Hopton and Mr. Marks discussed the conditions under which ground glass could be used to advantage, despite the interdictions of the author to the contrary.

Mr. Millar stated the practice of manufacturers in supplying photometric data with their lighting appliances could well be amplified by including the intrinsic brilliancy and the character and amount of absorption.

The concluding paper of the afternoon session, on "Illuminating Engineering from the Educational Standpoint," by Mr. F. K. Richtmyer, which was read by Mr. E. L. Elliott, in the absence of the author, covered the present course available at Cornell University.

Mr. Gartley spoke of the great value of college courses in promoting the cause, and Mr. Elliott stated it was to be hoped that architects would have the benefit of them, as like the story about the Scotchman, if he could be caught young enough he could be taught almost anything.

Mr. Ashe spoke in favor of having the regular courses in physics supplemented by lectures from practical men engaged in the work.

Mr. Bond suggested that recommendations as to the character and scope of the work be made by the Society as the author had requested. The meeting was then declared adjourned.

ENTERTAINMENT.

The Reception Committee wisely left the evening for less strenuous things, and the members, accompanied by a host of the fair sex, enjoyed a delightful musicale, which was followed by an informal reception, with many tempting viands to put hunger all away.

SECOND DAY—MORNING SESSION.

The weather was more propitious than on the day previous, and the morning session opened with many new faces. The first paper, describing the "Photometrical Laboratory of the United Gas Improvement Company," was presented by Mr. C. O. Bond, which was immediately followed by Dr. E. P. Hyde's paper on "The Physical Laboratory of the National Electric Lamp Association." The laboratory described by Mr. Bond marks a great step in the right direction and will be treated in detail in later issues.

Dr. Hyde described the work which is to be undertaken at Cleveland, which from the ambitious plans presented should be a boon to the industry.

Dr. Sharp who opened the discussion, called attention to the growing tendency among men of financial affairs to give greater consideration to matters which were far removed from any apparent direct benefits. The fact that such an elaborate and complete laboratory had been installed in a gas company marked a new era, as in former years the tendency had been toward the chemical rather than the photometrical side of the business.

Mr. Gartley stated that a few years ago the possession of a photometer gave a man a standing, but the trouble began when he had two and tried to make his results balance. [Laughter.]

The papers were also discussed by Messrs. Miller and Litle.

A paper on "Notes on Chemical Luminescence of Rare Earths," read by Dr. A. Simonini, was followed by a composite production, having the title of "The Light of the Firefly," by Messrs. H. E. Ives and W. W. Coblentz, conjointly. It was read by the former. Again we find Dr. Auer's name linked with work which has made illuminating engineering possible.

In investigating the light of the firefly the authors adopted a novel method of obtaining the energy distribution in the visible spectrum and used photographic plates. The most important result was the proof that the light from the firefly is a continuous band.

Dr. Sharp said that it was most gratifying to have two such valuable papers presented at the convention, and in discussing them referred to the fact that Dr Nicholls stated, nearly 20 years ago, that the efficiency of the gas mantle was due to phosphorescence or luminescence and not to temperature. Dr. Bell stated that he hoped that bolometer measurements would be taken by Dr. Ives in future experiments, as those taken by Professor Langley had received so much criticism. As a photographer was patiently waiting for the members to look their best, the discussion was closed and the meeting adjourned.

(To be Continued.)

Items of Interest
FROM VARIOUS LOCALITIES.

LOS ANGELES, CAL., Sept. 22, 1909.

DEAR JOURNAL: The following "ad." was printed in the Redlands (Cal.) "Daily Facts," under date of September 6th. The slogan that it shows in bold lettering is worthy of notice. Here it is:

"Back to the Drug Store,
"Back at the Old Stand.
"Will be glad to see all my old friends, and the new ones too, at
"21 and 23 East State street,
"For pure drugs from now on.
"I know more about drugs than I do about electricity and gas and
"building electric railroads.
"Three and a-half years ago the mortar and pestle were laid aside,
"to take up the cause of an oppressed people.
"Have your gas bill cut in two, and get better gas by using home
"gas."

"Copy of an advertisement appearing in this paper, November, 1907. Looks funny to-day; but it is all over. Some say that it was lack of support by the people; some say it was because the Trustees of two cities 'threw us down.' Makes little difference now what it was. We lit. We know that. And from now on, when you want the best there is in the market, in the way of drugs, soda water, cigars and toilet articles, 'too numerous to mention,' will be glad to serve you at the old stand, and endeavor to give to you the best there is for the money.—C. S. CHESTNUT, Chestnut Drug Co."

AND so the above is the sequel, yes, the winding up of a once greatly cherished hope of crushing a corporation by the home people getting together and the building of a plant by the people, for the people. Mr. C. S. Chestnut was the prime mover in the organization of the concern known as the Home Gas and Electric Company. Redlands is now very pleasantly and satisfactorily being taken care of by electricity furnished by the Edison Electric Company, which has always been the friend of the residents, and another Company is supplying the gas. This would be a delightful epitaph to inscribe on the headstone of the self-appointed Napoleons of finance and of rating competition in gas and electric currents now rapidly passing away in Southern California. It has required about 3 years, during which period many thousands of dollars have been wasted. Now, that it is over, with the exception of one city, the old line companies are beginning to feel that the game is not worth the candle.—J. M. B.

THE latest Bulletin from the press of the Gas Machinery Company, of Cleveland, O., has to do with "Retort House Governors." In fact that is the title of the "Bulletin." The booklet is in good accord with the other brochures that have been issued by the Company—right to the point in description and illustrative text. Its form number is 278.

IN the JOURNAL for September 20th we reported in our items of interest that the gain in meters placed by the Mohawk Gas Company, of Schenectady, N. Y., within a certain stated period amounted to 100. The truth, however, is that the gain figured out 1,000 instead of 100. Which is all to the greater glory of Manager Offutt and his busy men.

THE water gas apparatus in the new plant of the Ironwood (Mich.) Gas Company will be installed by the Gas Machinery Company, of Cleveland, O. It is quite likely, in fact, it is certain, that the supply to Hurley will be conveyed thereto from Ironwood.

MR. DANVILLE DECKER, to whom was committed a year ago the task of rebuilding the gas plant at Ogden City, Utah (this property is dominated by the Utah Railway and Light Company), reports that it was a pretty bad situation, but the task has been successfully com-

pleted, and that the output on fuel account has really developed into a trade well worth while. Considerable main extension was completed, every line of which, however, is returning a goodly sum in the shape of interest on the investment. Mr. Decker says the owners of the Company are right up to the situation.

About a fortnight ago the City Trustees of Redlands, Cal., settled the matter of the gas rate, which had been in dispute for some time. Under the agreement the Company will charge the rate of $1.25 per 1,000. The contention of the latter was a $1.35 rate.

Mr. E. T. Coffin, for quite a while connected with the Municipal Gas Company, of Albany, N. Y., has resigned from its service to make an important business connection with a well-known publishing firm of New York city.

The tremendous dual storm of wind and rain that swept New Orleans and the surrounding districts the third week in September, played havoc with the suppliers of electric currents. The New Orleans Gas Light Company, although sorely tried, came out of it virtually unscathed. Mr. T. D. Miller in a letter dated September 22d, respecting the visitation, said: "The storm was pretty bad, but our holders stood up all right. The wind swept many slates from our roofs, but no interruption of any kind to our service occurred. The electric current suppliers were not so fortunate, however, current being cut off for quite a while. We did what we could to help them out, and, strange to say, they have since said we are not bad neighbors. So far as we are concerned we never had any other thought than that we were—and are—friends. Was sorry to have missed the 'Only Lynn's' Lake trip; but I'll be with you all in Detroit later in the month."

Mr. Samuel M. Vance is now in full charge, as General Manager, of the plants of the Bristol (Tenn.) Gas and Electric Company. This is surely well deserved promotion and we wish him every possible good luck.

The residents of Lynnfield (Mass.) are insisting that the Lynn Gas and Electric Company shall extend its distribution system through "their midst." And 'tis sure to be done if they can convince Mr. Prichard that the extension will earn 5 per cent. on its cost.

At the annual meeting of the Worcester (Mass.) Gas Light Company the Directors elected were: Charles D. Lamson, Thomas B. Eaton, Samuel B. Woodward, A. G. Bullock, Francis H. Dewey and Albert Wood. The Directors subsequently elected, as President, Mr. Charles D. Lamson.

Judge Putnam has entered a final decree adjusting the amounts that the remaining lawyers in the Bay State Gas Company litigation may receive. Their claims footed $212,500; they were allowed $105,064.

It is reported that the Town Council, of Galt, Canada, is considering the proposition to purchase, for operating on municipal account, the electric lighting plant owned by the Galt Gas Light Company. The valuation put upon the property by its present owners is $67,000, which amount does not include the "water power at the dam" possession, an auxilliary property earning a rental of $1,474. The matter of proving the estimate of value is, through reference, in the hands of Mr. E. Merrill, C.E.

"St. John, Ore., is to have a gas supply," so writes a correspondent in Portland, Ore., under date of September 24th. Continuing, our informant adds: "The connection to the Portland Company's main will be made in Piedmont, the main (6 inches diameter) being of the high pressure type and sufficient to meet the gaseous requirements of Piedmont for some time to come.

Mr. W. A. Aldrich, writing from Tacoma, Wash., under date of September 24th, says: To the Editors American Gas Light Journal —My attention has been called to a paragraph in your issue of September 20th referring to a request from our patrons in South Tacoma to have the Tacoma Gas Light Company moved to South Tacoma, that the pressure is so low that the use of gas is of the farcical order, and it is suggested that Manager Hyde put in a high pressure line. It may be of interest to you to know that South Tacoma is supplied through a high pressure line, with individual governors; and, with the exceptional blowing out of a seal, we never receive a complaint. Consequently the paragraph referred to is indeed of itself farcical. The cities of the Northwest are growing at an extraordinary rate, and an up-to-date, adequate plant will be useless 10 years from now, but long distance transmission of gas by high pressure is a panacea in all rush cases. Manager Hyde is now engaged in running a high pressure line around the city, reinforcing the present low pressure system and forming other low pressure districts. It will require nearly 50 miles of main to do this work, but all the material is ordered; and, as soon as the work is completed, Tacoma will have one of the most modern and up-to-date systems of gas distribution in this country.

Whether or not the complaints of some of the residents of South Tacoma, that their pressure at "peak use" of gas was hindered from one cause or another, were true, at one time, Mr. Aldrich undoubtedly looks to have placed them where complaints will be less active, if not cut out altogether. By-the-way, mention of that clever, capable gentleman's name recalls the fact that last Friday he assumed charge of all the plants operated by the Deane syndicate of Grand Rapids, Mich. In that named city Mr. Aldrich is to have his headquarters. All possible good luck to him is our honest, hearty wish.

"P. V. M.," writing under date of the 26th inst., from Richmond, Va., incloses the following: "Contrary to the belief expressed last year, when the price of gas was lowered by the city to 90 cents from $1 per 1,000, there is little decrease in the revenues of the city from the gas department. An estimate prepared by Superintendent Knowles shows that up to the 21st September the receipts are only $12,000 behind those of last year, notwithstanding a 10 per cent. cut in the selling rate, which it was predicted would reduce the city's revenue fully $40,000 the first year. With the 4 best gas consuming months in the year to hear from it is likely now, or at the end of the twelvemonth, that the revenue decrease will be less than $8,000. Large increases in the use of gas for cooking and intermittent heating accounts, the officials say, are the causes for this satisfactory result."

The earnings on the capital stock of the Peoples Gas Light and Coke Company, of Chicago, are said to be not far from 10 per cent.

The new meter house of the Providence (R. I.) Gas Company will have these dimensions: 57 feet long, 53 feet wide and 26½ feet high. The construction will be made by the well-known local firm of C. H. Maguire & Co.

Messrs. H. M. Byllesby & Co., of Chicago, have purchased a much more than controlling interest in the properties of the El Reno (Okla.) Gas and Electric Light Company. The new owners will expend a large sum on plant betterment account.

Mr. Frederic A. Cook has been appointed Superintendent of the Essex (Conn.) Light and Power Company.

The proprietors of the Defiance (O.) Gas Company have determined to go on with the reconstruction of the gas and electric lighting plants, and it has been determined to push the sale of gas in a manner bound to bring good returns.

We are indebted to the courtesy of Mr. J. J. Brooks, Jr., General Sales Manager of the Harbison-Walker Refractories Company, of Pittsburgh, Pa., for a copy of the Company's latest literary effort, which bears the title, "A Study of the Open Hearth." It has to do, of course, as the title indicates, more with the firing of great steel and iron furnaces; in fact, with millwork on a huge scale. However, quite a bit of (almost all of Chapter II.) deals with the fuels used in the "Open Hearth," and it is here that the gas man will readily appreciate the book's worth. The get-up of the book is irreproachable.

The Evens & Howard Firebrick Company, of St. Louis, Mo., report the receipt of several good orders within the month, prominent in the list being authorizations for refillings, from Roanoke, Va., and La Porte, Ind.

Mr. Charles B. Healey, Cashier for the Woonsocket (R. I.) Gas Company, has resigned that position to accept the dual post of bookkeeper and paymaster to the Nasonville Woolen Company.

At the annual meeting of the shareholders in the Woonsocket Gas Company, the following Directors were elected: C. E. Ballou, S. Buttrick, F. A. Sayles, R. Cobb, F. S. Pratt, F. A. Bemis, F. E. Holden, J. W. Ellis and C. H. Darling.

At the annual meeting of the Columbus (Ind.) Gas Company, the retiring Directors were re-elected. The Board perfected the following executive management: President, J. W. Thompson; Vice-President, C. W. Keller; Secretary, D. A. Barnes; Treasurer, W. E. Moro.

THE AMERICAN GAS LIGHT JOURNAL

A. M. CALLENDER & CO.,
PROPRIETORS.

THOS. J. CUNNINGHAM,
ELBERT P. CALLENDER,
EDITORS.

CHARLES H. WADELTON,
MANAGER.

PUBLISHED ON EACH MONDAY OF THE YEAR AT
No. 42 Pine Street, New York.
Telephone, 2996 John.

MONDAY, OCTOBER 4, 1909.

The Market for Gas Securities.

The quotations for Consolidated gas, since Tuesday last, have been on the low side, and at times during the sessions considerable blocks of the shares were recorded as changing hands. For instance, up to noon to-day (Friday) 3,600 shares were recorded as sold—the opening having been made in connection with 900 at 146¼. It then sold down to 145⅝, to where it "bobbed," at 145½ to ¾. As has been said in these columns for months, the present situation in the Company's affairs is the best in its history.

Brooklyn Union is 148 bid, Peoples, of Chicago, is 116 bid. American Light and Traction is 256 bid—holders of these say that 300 will be about the correct figure by Christmas. There is always in evidence a good demand for accredited bond issues.

Gas Stocks.

Quotations by George W. Close, Broker and Dealer in Gas Stocks.

16 WALL STREET, NEW YORK CITY.

OCTOBER 4.

☞ All communications will receive particular attention.

☞ The following quotations are based on the par value of $100 per share:

N. Y. City Companies.	*Capital.*	*Par.*	*Bid.*	*Asked.*
Consolidated Gas Co.	$73,177,000	100	145¾	146¼
Central Union Gas Co.—				
1st 5's, due 1972, J. & J.	3,000,000	1,000	98	101
Equitable Gas Light Co.—				
Con. 5's, due 1932, M. & S.	1,000,000	1,000	—	105
Mutual Gas Co.	3,500,000	100	155	165
New Amsterdam Gas Co.—				
1st Con. 5's, due 1948, J. & J.	11,000,000	1,000	100	101½
New York & Richmond Gas Co. (Staten Island)	1,500,000	100	37	43
1st Mtg. Gold Bds. 5 p. ct.	1,000,000	—	100	101
New York and East River—				
1st 5's, due 1944, J. & J.	3,500,000	1,000	104	107
Con. 5's, due 1945, J. & J.	1,500,000	—	97	101
Northern Union—				
1st 5's, due 1927, J. & J.	1,250,000	1,000	94	100
Standard	5,000,000	100	—	75
Preferred	5,000,000	100	70	100
1st Mtg. 5's, due 1930, M. & N.	1,500,000	1,000	100	105
The Brooklyn Union	15,000,000	1,000	147½	148¼
1st Con. 5's, due 1948, M. & N.	15,000,000	—	91½	92
Yonkers	299,650	500	130	—
Out-of-Town Companies.				
Bay State	50,000,000	50	1	1½
" Income Bonds	2,000,000	1,000	—	75
Binghampton Gas Works	450,000	100	—	65
" 1st Mtg. 5's	500,000	1,000	90	96
Boston United Gas Co.—				
1st Series S. F. Trust	7,000,000	1,000	82	85
2d " " "	3,000,000	1,000	47½	50
Buffalo City Gas Co.	5,500,000	100	5	8
Bonds, 5's	5,250,000	1,000	73	73½
Capital, Sacramento	500,000	50	—	35
Bonds (6's)	150,000	1,000	—	—
Chicago Gas Co. Guaranteed Gold Bonds	7,660,000	1,000	104	106¼
Cincinnati Gas and Electric Co.	29,500,000	100	92	93
Columbus (O.) Gas Co., 1st Mortgage Bonds	1,500,000	1,000	96	98
Columbus (O.) Gas Lt. & Heating Co.	1,682,750	100	90½	91
Preferred	3,026,500	100	75½	80
Consumers, Toronto	2,000,000	50	200	204
Consolidated, Baltimore	11,000,000	100	—	105
Mortgages, 6's	3,600,000	—	—	118
Chesapeake, 1st 6's	1,000,000	—	—	—
Equitable, 1st 6's	910,000	—	—	—
Consolidated, 1st 5's	1,490,000	—	—	112
Consolidated Gas Co. of N. J.	1,000,000	100	15	17
Con. Mtg. 5's	880,000	1,000	92	95
Bonds	75,000	—	—	100
Denver Gas and Electric	458,000	—	102	105
Detroit City Gas Co	5,000,000	50	—	50
" Prior Lien 5's	4,619,000	1,000	97	100½
Detroit Gas Co., 5's	381,000	1,000	75	80
Equitable Gas & Fuel Co., Chicago, Bonds	2,000,000	1,000	—	101
Essex and Hudson Gas Co.	6,500,000	—	39	40
Fort Wayne	2,000,000	—	—	—
" Bonds	2,000,000	—	55	—
Grand Rapids Gas Light Co., 1st Mtg. 5's	1,225,000	1,000	104½	105
Hartford	750,000	25	190	200
Hudson County Gas Co., of New Jersey	10,500,000	—	112	113½
" Bonds, 5's	10,500,000	—	108	108½
Indianapolis	2,000,000	—	60	70
" Bonds, 5's	2,650,000	—	104½	105
Jackson Gas Co.	250,000	50	82	—
" 1st Mtg. 5's	290,000	1,000	97	100
Kansas City Gas Light Co., of Missouri	5,000,000	100	—	36
Bonds, 1st 5's	3,822,000	1,000	102	104
Laclede Gas Co., St. Louis.	10,000,000	100	104	105
Preferred	2,500,000	100	—	98
Bonds	10,000,000	1,000	104	—
Lafayette Gas Co., Ind.	1,000,000	100	—	60
Bonds	1,000,000	1,000	60	65
Louisville	2,570,000	50	143	145
Madison Gas and Electric Co.				
" 1st Mtg. 6's	350,000	1,000	106	108¾
" 6 per cent. scrip, due 1910	100,000	25	60	60½
Massachusetts Gas Companies, of Boston	25,000,000	100	67	67⅛
Preferred	25,000,000	100	92½	93
Montreal Gas Co., Canada	2,000,000	100	218	218¾
Nashville Gas Light Co.	1,000,000	100	110	—
Newark, N. J., Con. Gas Co.	6,000,000	—	56	58
Bonds, 6's	6,000,000	—	137	138
New Haven Gas Co.	2,000,000	25	200	—
Peoples Gas Lt. & Coke Co., Chicago	25,000,000	100	116	116¼
1st Mortgage	20,100,000	1,000	—	—
2d "	2,500,000	1,000	104	—
Rochester Gas & Electric Co.	2,150,000	50	88	—
Preferred	2,150,000	50	118	—
Consolidated 5's	2,000,000	—	104½	105½
San Francisco Gas Co., Cal.	15,500,000	—	—	—
St. Joseph Gas Co.—				
1st Mtg. 5's	751,000	1,000	100	102
St. Paul Gas Light Co.	1,500,000	100	45	47
1st Mortgages, 6's	650,000	1,000	113	116
Extension, 6's	600,000	1,000	112½	115
General Mortgage, 5's	2,465,000	1,000	90	95
Syracuse Gas Co., N. Y.	1,975,000	100	50	55
Bonds	2,047,000	1,000	100	104
Washington (D. C.) Gas Co.	1,600,000	20	363½	367½
1st Mortgage, 6's	600,000	—	—	—
Western Gas Co., Milwaukee	4,000,000	—	—	—
Wilmington (Del.) Gas Co.	600,000	50	220	—

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Connelly Iron Sponge & Governor Co., New York City. 845
Evens & Howard Firebrick Co., St. Louis, Mo. 838
Isbell-Porter Co., Newark, N. J. 836
Pittsburg Meter Co., East Pittsburg, Pa. 834
Reynolds Gas Regulator Co., Anderson, Ind. 845

CEMENTS.

C. L. Gerould, New Castle, Pa. 844
Laclede-Christy Clay Products Co., St. Louis, Mo. 844
Strassburger Bros., Chicago, Ills. 844

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Chamber Oven Co., Milwaukee, Wis. 831
Didier-March Co., New York City 829
Evens & Howard Firebrick Co., St. Louis, Mo. 838
Gas Bench Construction Co., St. Louis, Mo. 837
Henry Maurer & Son, New York City 837
Improved Equipment Company, New York City 830
James Gardner, Jr., Co., Bolivar, Pa. 846
J. H. Gautier & Co., Jersey City, N. J. 844
Laclede-Christy Clay Products Co., St. Louis, Mo. 844
Missouri Firebrick Co., St. Louis, Mo. 844
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. ... 839

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Evens & Howard Firebrick Co., St. Louis, Mo. 838
Gas Bench Construction Co., St. Louis, Mo. 837
Improved Equipment Company, New York City 830
Laclede-Christy Clay Products Co., St. Louis, Mo. 844
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. .. 839

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Improved Equipment Company, New York City 830
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Parker-Russell Mining and Mfg. Co., St. Louis, Mo. .. 839

REGENERATIVE FURNACES.

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Didier-March Co., New York City 829
Evens & Howard Firebrick Co., St. Louis, Mo. 838
Gas Bench Construction Co., St. Louis, Mo. 837
Improved Equipment Company, New York City 830
J. H. Gautier & Co., Jersey City, N. J. 844
Laclede-Christy Clay Products Co., St. Louis, Mo. 844
Missouri Firebrick Co., St. Louis, Mo. 834
Parker-Russell Mining and Mfg. Co., St. Louis, Mo... 839

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Davis & Farnum Mfg. Co., Waltham, Mass. 848
Isbell-Porter Co., Newark, N. J. 836
Improved Equipment Company, New York City 830
Kerr Murray Mfg. Co., Fort Wayne, Ind. 849
Parker-Russell Mining and Mfg. Co., St. Louis, Mo. 839
Quintard Iron Works, New York City 837
R. D. Wood & Co., Philadelphia, Pa. 850
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Isbell-Porter Co., Newark, N. J. 836
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Quintard Iron Works, New York City 837
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The Stacey Mfg. Co., Cincinnati, O 851
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Western Gas Construction Co., Fort Wayne, Ind. 808

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Davis & Farnum Mfg. Co., Waltham, Mass. 848
Economical Gas Apparatus Construc. Co., Toronto, Ont. 826
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The Stacey Mfg. Co., Cincinnati, O. 851
Western Gas Construction Co., Fort Wayne, Ind. 808

(*Continued on page* 826.)

DIVIDEND NOTICE.

OFFICE OF THE UNITED GAS IMPROVEMENT CO.,
N. W. CORNER BROAD AND ARCH STS.,
PHILADELPHIA, PA., Sept. 8, 1909.

The Directors have this day declared a quarterly dividend of 2 per cent. (one dollar per share), payable Oct. 15th, 1909, to stockholders of record at the close of business, Sept. 30, 1909. Checks will be mailed.

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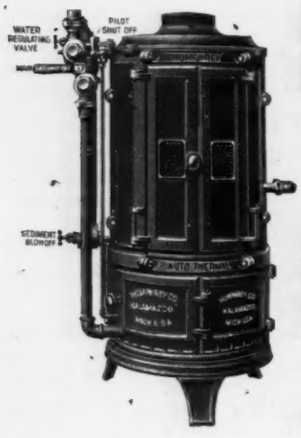

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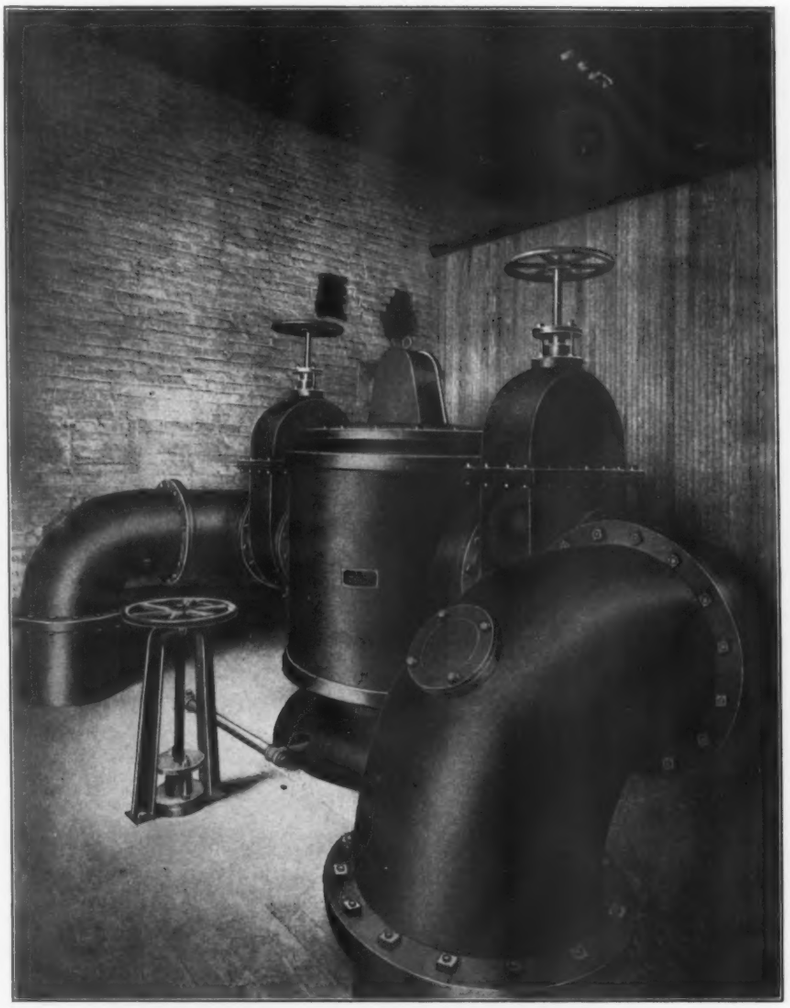

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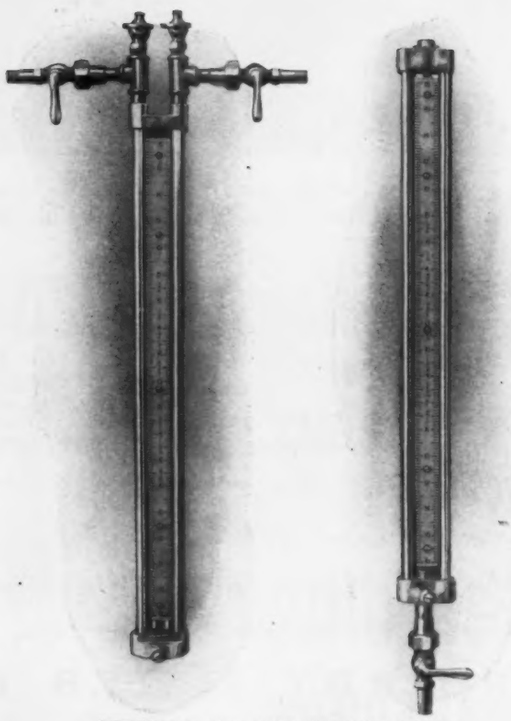

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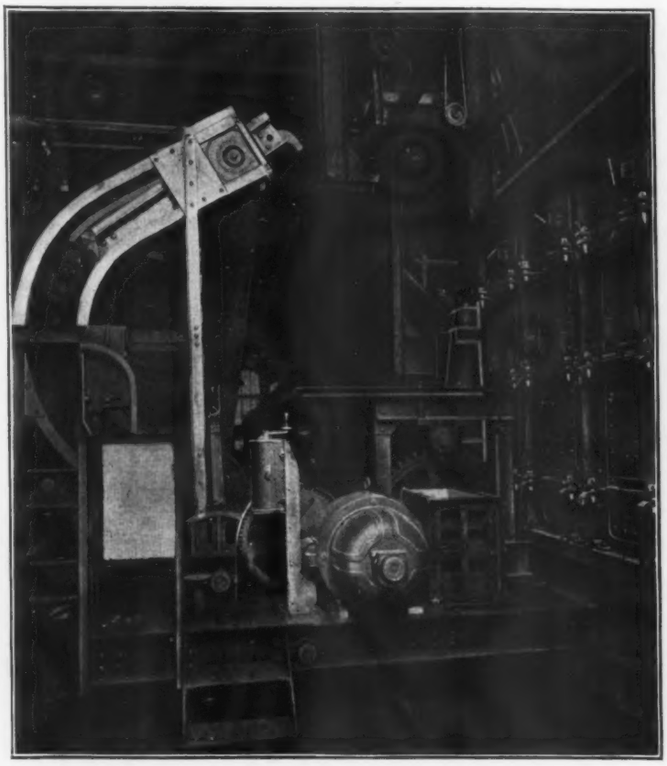

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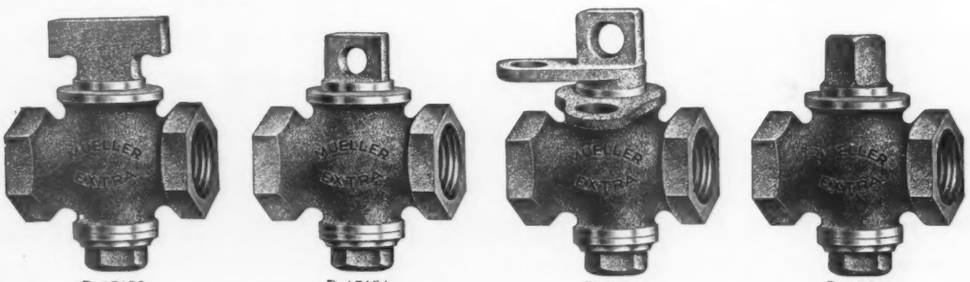

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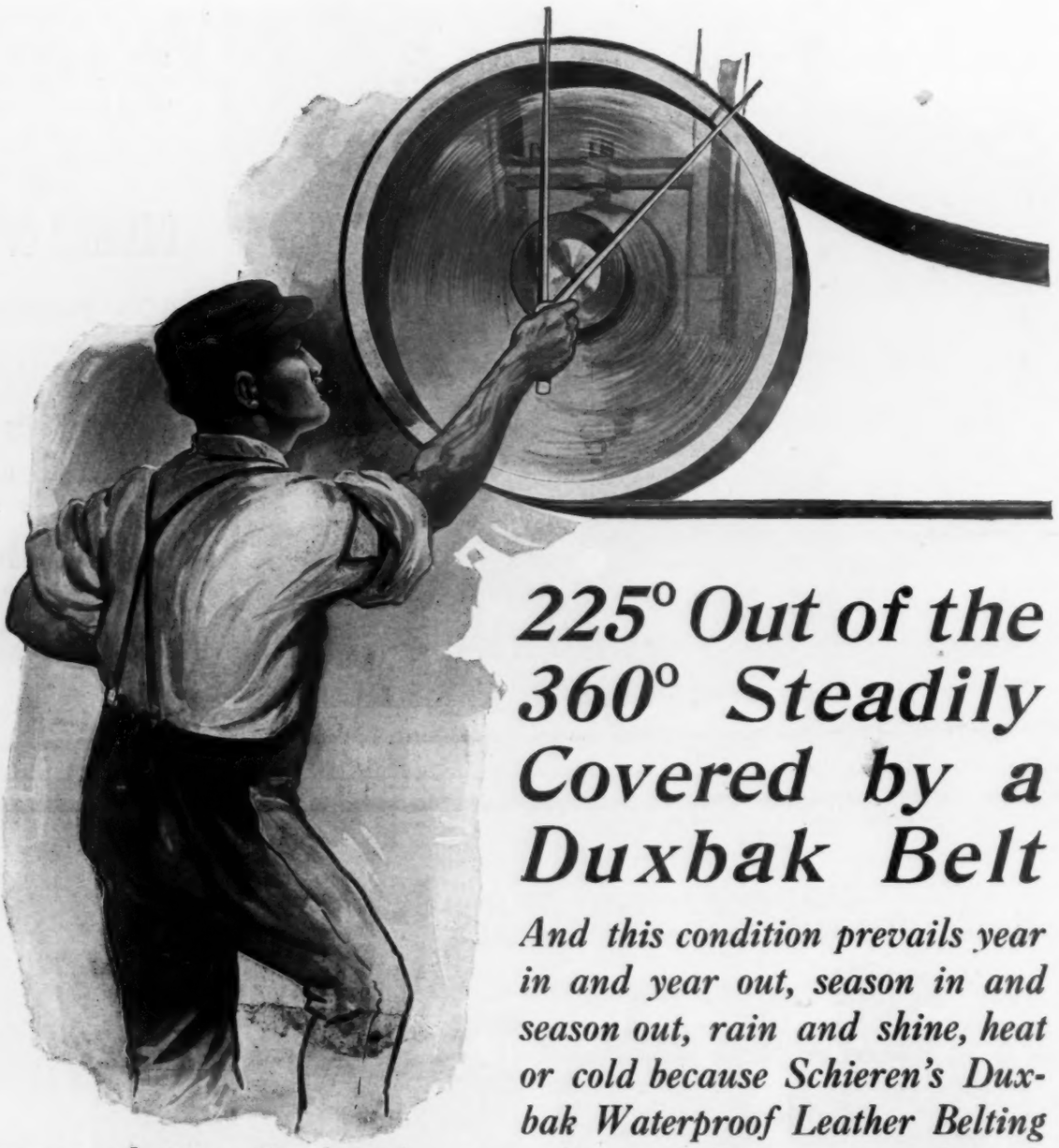

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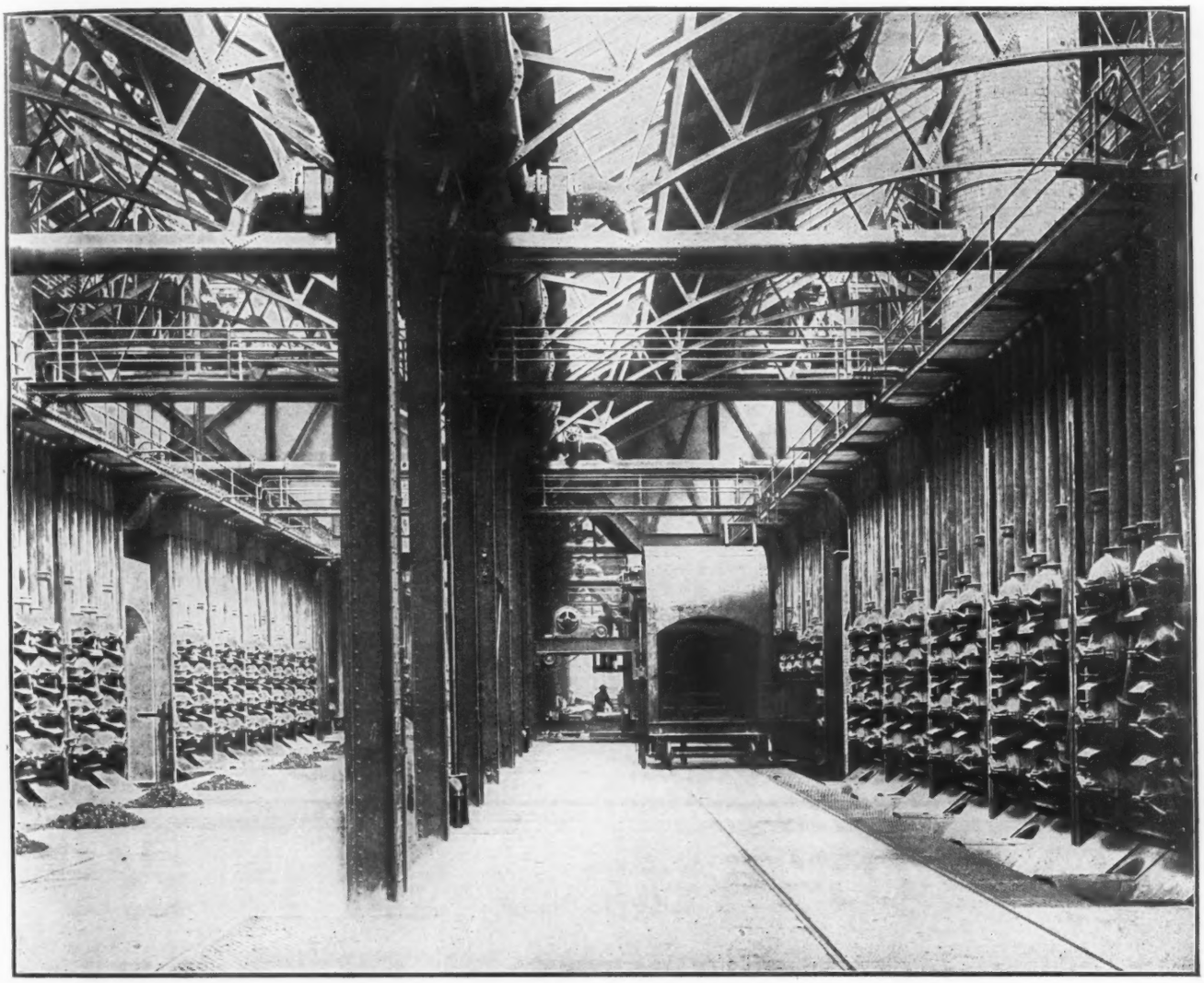

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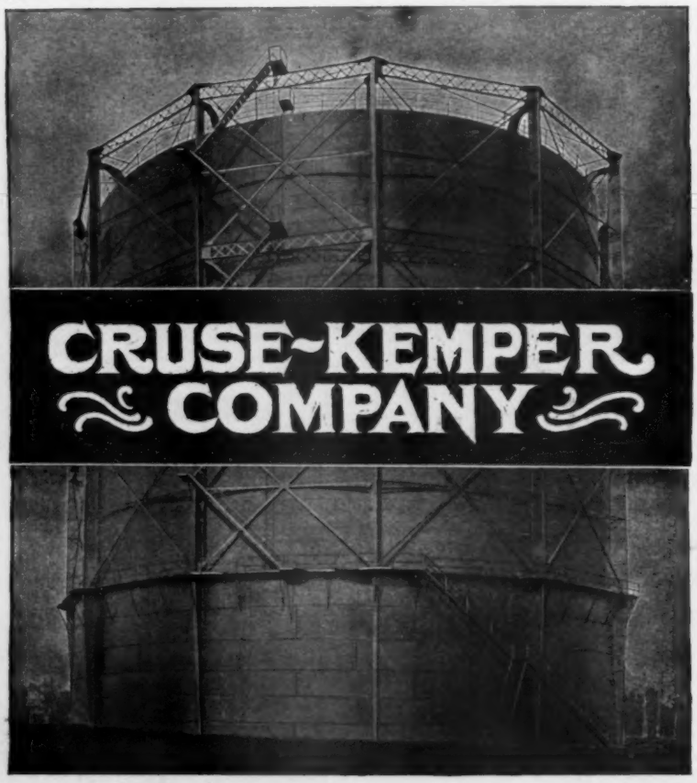

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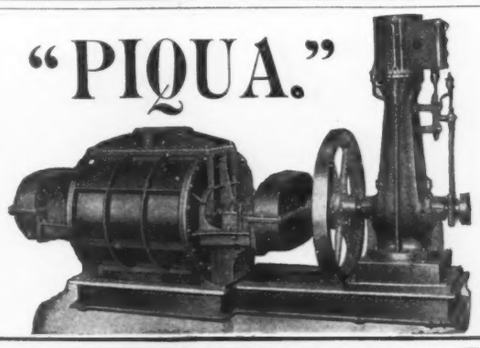

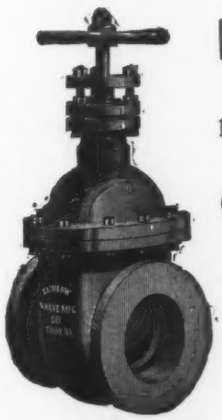

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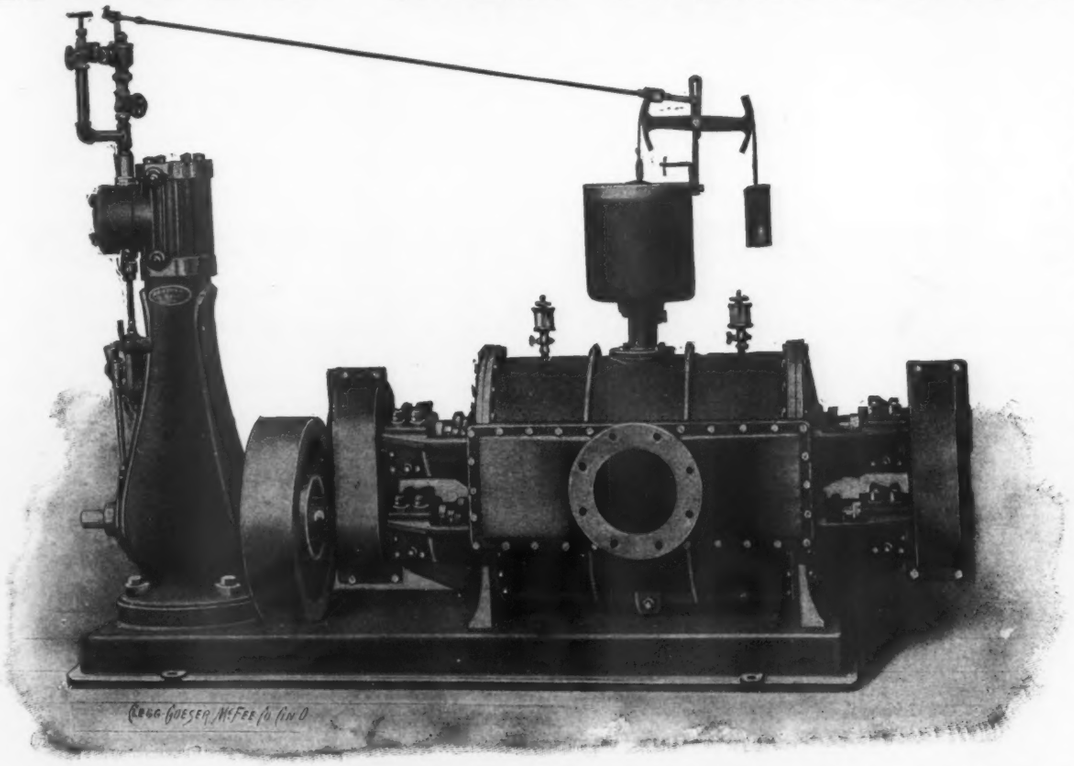

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A Half-Century History of Water Gas. F. N. Morton.

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Systems of Vertical Retorts. Fred. J. Mayer.

Development of the Ammonia Industry in Gas Works during the Last 50 Years. R. W. Hilgenstock.

Residuals, Some History of. Carroll Miller.

Meters and Meter Makers. D. McDonald.

Progress in Electric Current Development in the Artificial Lighting Field. A. F. Ganz.

Development of the New Business Division of the Gas Industry during the Last 50 Years. Philmer Eves.

Growth and Value of Demonstration Work in the Household of Gaseous Fuel. Helen Armstrong.

"Uncle Jerry" in Reminiscent Mood. J. B Howard.

Present-Day Photometrical Practice. W. H. Gartley.

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Photometrical and Experimental Apparatus.

PUBLIC LIGHTING TABLE.

OCTOBER, 1909.

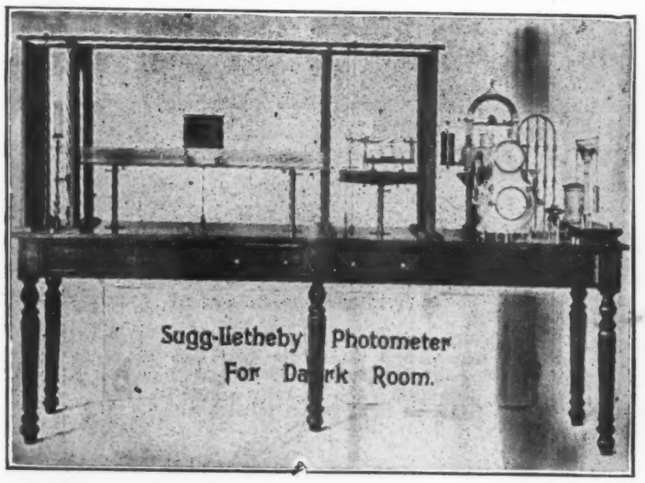
Table No. 1.
FOLLOWING THE MOON.

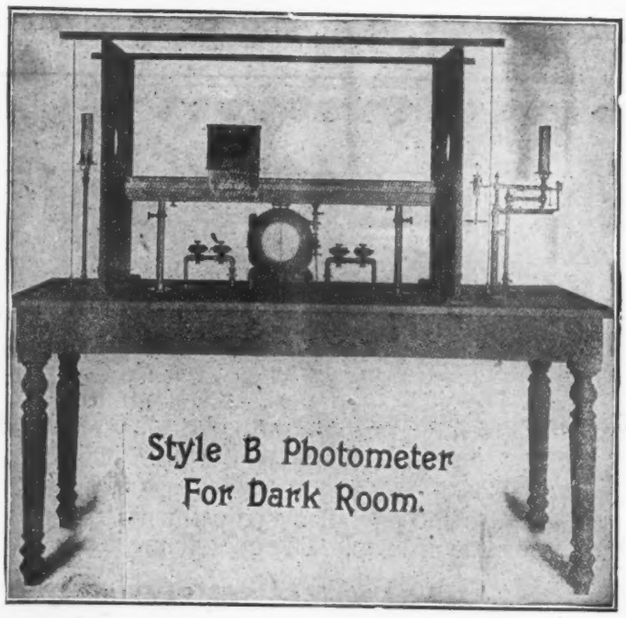
Day of Week.	Date.	Light.	Extinguish.
Fri.	1	6 10PM	8.20PM
Sat.	2	6.10	8 50
Sun.	3	6.10	9.30
Mon.	4	6.10	10.20
Tue.	5	6.10LQ	11.10
Wed.	6	6.10	12.10AM
Thu.	7	6.10	1.10
Fri.	8	6.10	2.20
Sat.	9	6.10	3.20
Sun.	10	6.00	5.10
Mon.	11	6.00	5.10
Tue.	12	6.00	5.10
Wed.	13	6.00NM	5.10
Thu.	14	6.00	5.10
Fri.	15	6 00	5.10
Sat.	16	6.00	5.10
Sun.	17	5.50	5.20
Mon.	18	6.50	5.20
Tue.	19	7.30	5.20
Wed.	20	8.20	5.20
Thu.	21	9.20LQ	5.20
Fri.	22	10.30	5.20
Sat.	23	11.40	5.20
Sun.	24	1.00AM	5.20
Mon.	25	2.10	5.20
Tue.	26	3.30	5.20
Wed.	27	No L.	No L.
Thu.	28	No L.FM	No L.
Fri.	29	No L.	No L.
Sat.	30	5.30PM	7.20PM
Sun.	31	5.30	8.10

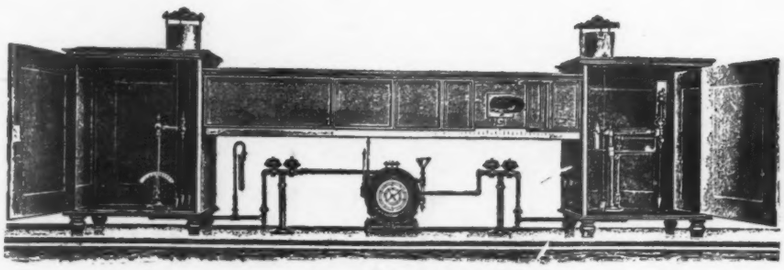
TOTAL HOURS DURING 1909.

By Table No. 1.

	Hrs.Min.
January	212.20
February	183.40
March	173.00
April	151.10
May	144.10
June	138.50
July	145.40
August	160.30
September	180.00
October	201.00
November	216.30
December	233.40
Total, yr.	2140.30







Closed Photometer For Light Room.

CIRCULARS SENT ON REQUEST.

PUBLIC LIGHTING TABLE.

OCTOBER, 1909.

Table No. 2.
NEW YORK CITY.
ALL NIGHT LIGHTING.

Day of Week.	Date.	Complete Lighting in One Hour From Time Given P. M.	Complete Extinguishing in 50 Minutes From Time Given A.M.
Fri.	1	5.22	4.42
Sat.	2	5.22	4.42
Sun.	3	5.22	4.42
Mon.	4	5.22	4.42
Tue.	5	5.22	4.42
Wed.	6	5.22	4.42
Thu.	7	5.22	4.42
Fri.	8	5.12	4.52
Sat.	9	5.12	4.52
Sun.	10	5.12	4.52
Mon.	11	5.12	4.52
Tue.	12	5.12	4.52
Wed.	13	5.07	4.52
Thu.	14	5.07	4.52
Fri.	15	4.57	5.02
Sat.	16	4.57	5.02
Sun.	17	4.57	5.02
Mon.	18	4.57	5.02
Tue.	19	4.57	5.02
Wed.	20	4.57	5.02
Thu.	21	4.57	5.02
Fri.	22	4.47	5.07
Sat.	23	4.47	5.07
Sun.	24	4.47	5.07
Mon.	25	4.47	5.07
Tue.	26	4.47	5.07
Wed.	27	4.47	5.07
Thu.	28	4.47	5.07
Fri.	29	4.37	5.17
Sat.	30	4.37	5.17
Sun.	31	4.37	5.17

TOTAL HOURS DURING 1909.

	Hrs.Min.
January	428.30
February	358.15
March	353.10
April	298.10
May	263.20
June	234.45
July	248.30
August	278.00
September	311.25
October	370.05
November	397.40
December	438.35
	3980.25
Deduct on account of 50 min. extinguishing time	30.25
Total, yr.	3950.00

NEW YORK, 318 West 42d Street. BOSTON, 820 Beacon Building. PHILADELPHIA, Broad and Arch Streets. ST. LOUIS, 712 Roe Building. CHICAGO, 218 La Salle Street. SAN FRANCISCO, 512 Oak Street.

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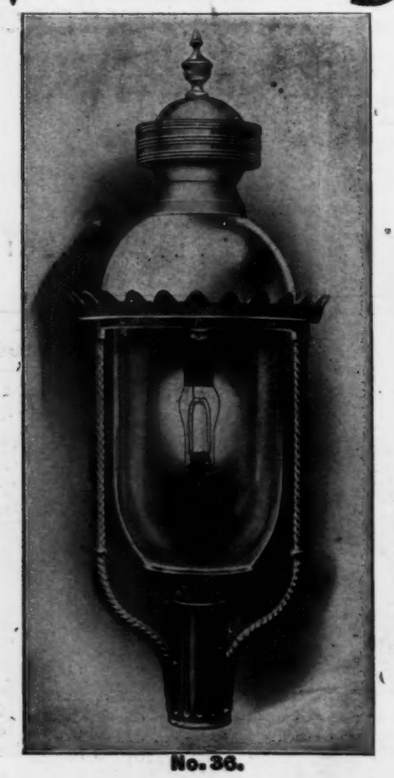
....OF AMERICA....



No. 36.

Controls and Operates the **Welsbach System of Street Lighting,**

Which includes its specially DESIGNED and PATENTED BURNER for PARK LIGHTING exclusively.

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By means of the Welsbach System of street lighting the superiority of GAS over electricity for street lighting has been fully demonstrated.

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IT LIGHTS THE STREET.

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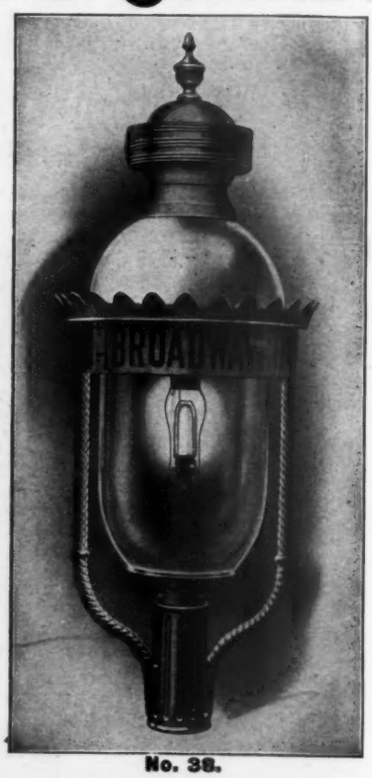
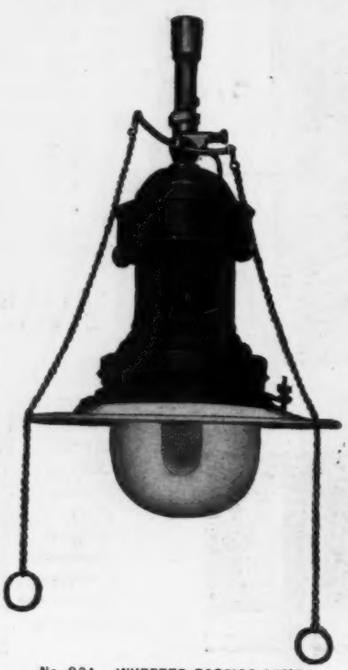
Correspondence Solicited from Gas Companies and Others interested in Municipal and Outside Lighting.



No. 38.

Welsbach Inverted Portico Lamps



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For all semi-exposed places—porticos, entrances, etc. simple in construction, few parts; exterior made of enameled steel, interior parts of heat-resisting material that are practically indestructible. Wind, storm and insect proof.

The globes on designs No. 901 and No. 902 are supported in a flanged reflector that provides for heat expansion. The reflector being hinged, it can readily be lowered for cleaning or trimming the lamp.

Gas and pilot-flame adjustment by means of needle valves from outside of lamp. The pilot-flame is protected and will not blow out.

Three Styles from which to Choose:

No. 902.

Equipped with No. 5 clear globe and steel enameled reflector 8¾ inches in diameter and 1½ inches deep. Finish, dark green enamel.

Dimensions: Length over all, 16 inches; diameter of globe, 5 inches; depth of globe, 4 inches. List price, complete, without mantles... $8 00

No. 900.

Equipped with 7 inch alabaster or sand-blast ball globe. Finish, dark green, or white and gold enamel. Dimensions: Length over all, 17½ inches.

White and gold enamel. List price, without mantles..... $9.00

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No. 901.

Same as 902 portico lamp, except steel enameled reflector, which is flat, and 10 inches in diameter.

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OF THE

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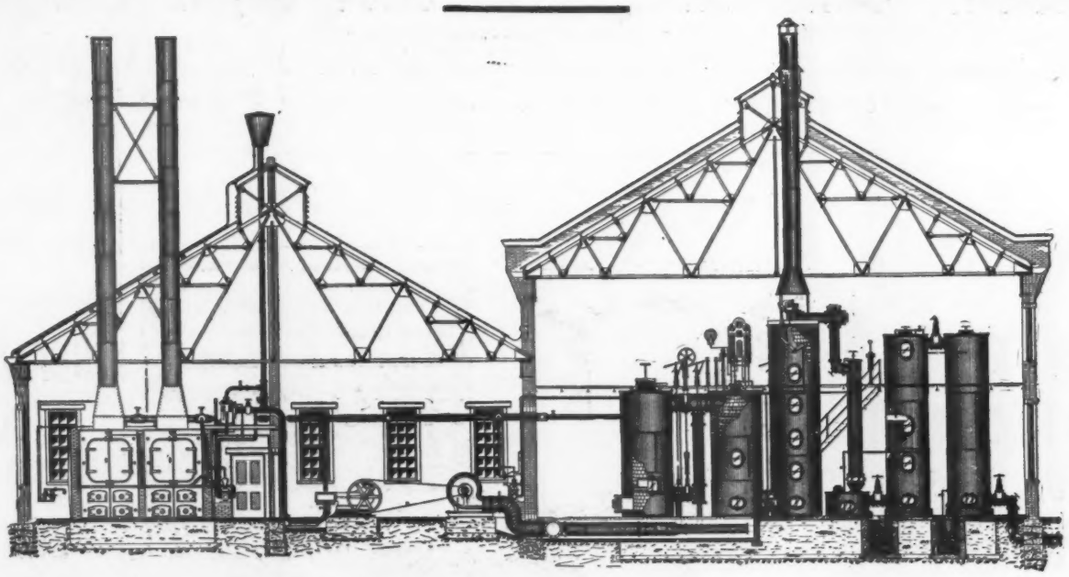

TOTAL SETS INSTALLED TO JULY 1, 1909, ... 704
TOTAL DAILY CAPACITY TO JULY 1, 1909, ... 577,440,000 cu. ft.

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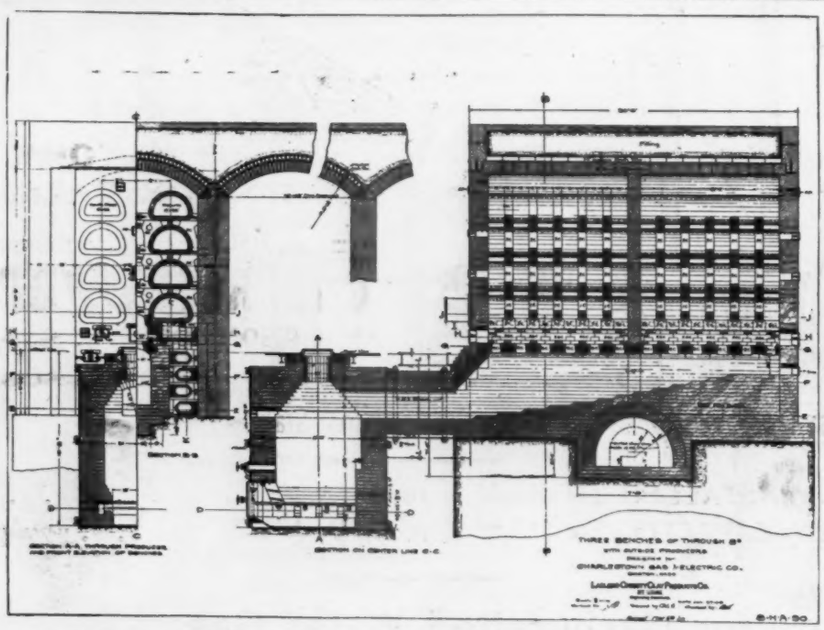

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Size.....	8 inches	10 inches	12 inches	16 inches	20 inches	24 inches	30 inches	36 inches
Diameter of flanges....	13 inches	16 inches	18 inches	22½ inches	27 inches	31 inches	31½ inches	44 inches
Face to face of flange...	12 inches	12 inches	12 inches	14 inches	17 inches	20 inches	21 inches	23½ inches

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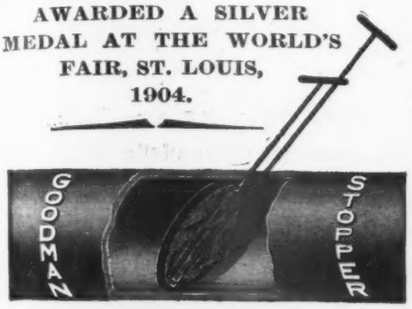

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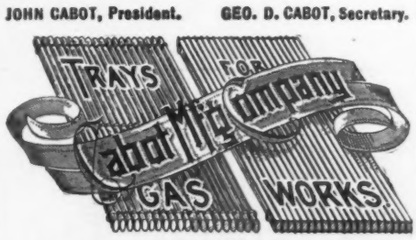

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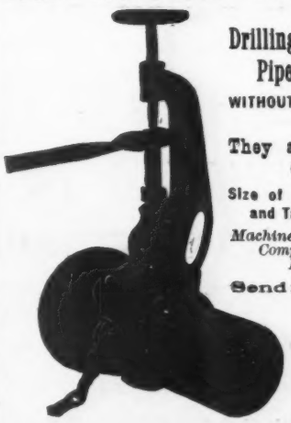

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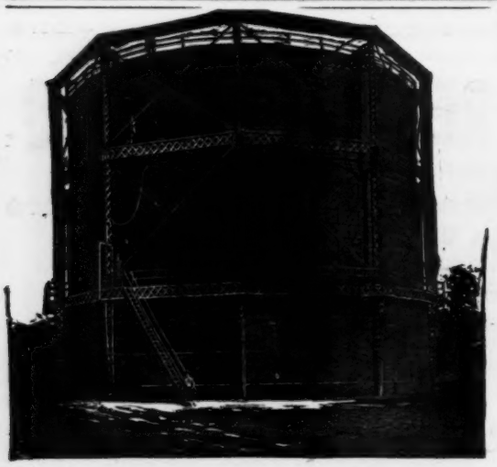

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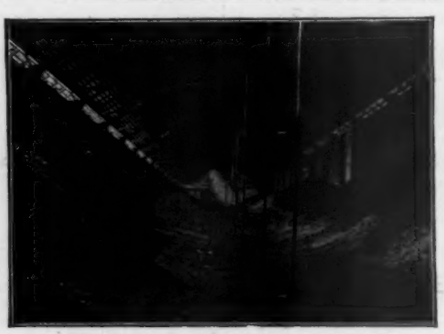

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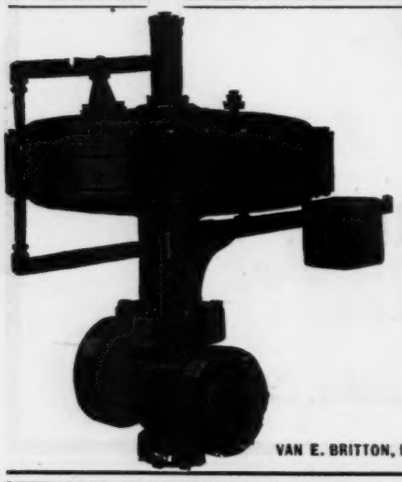

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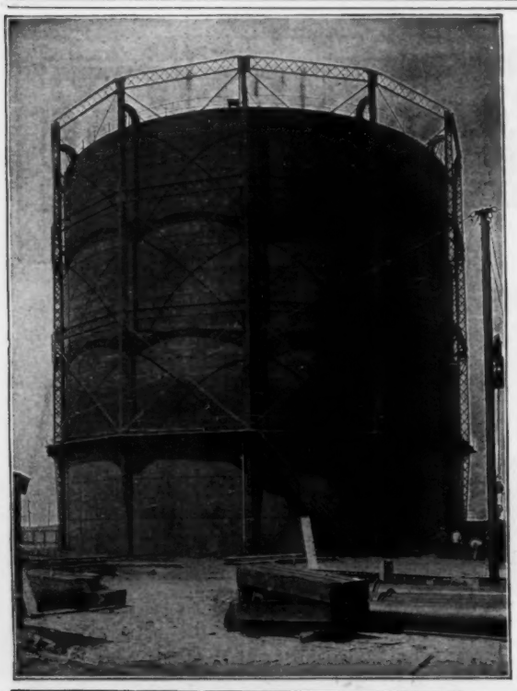

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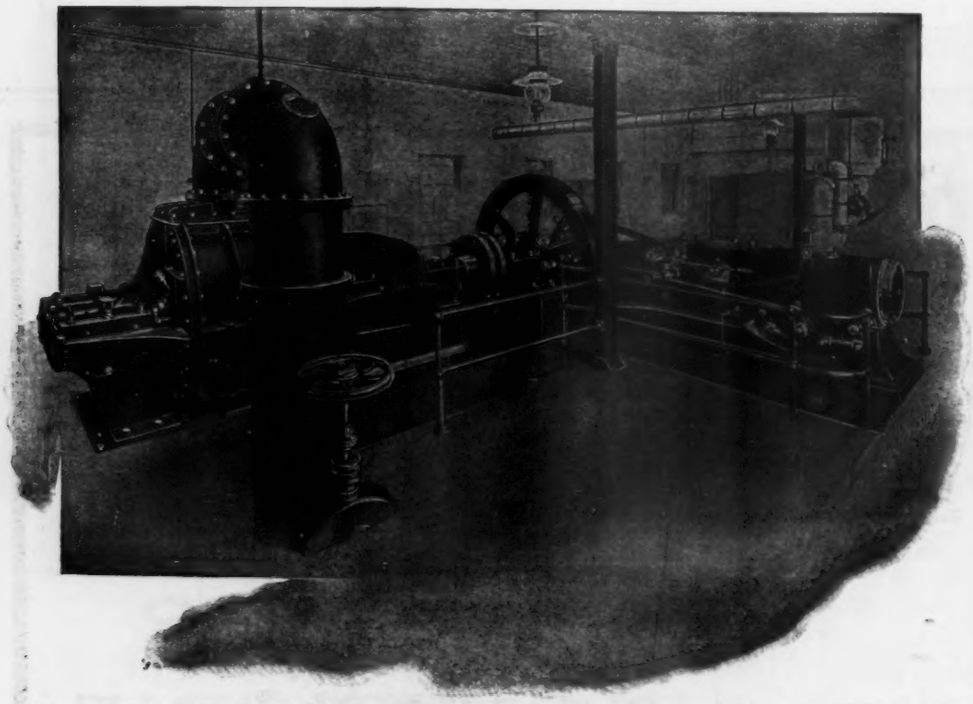

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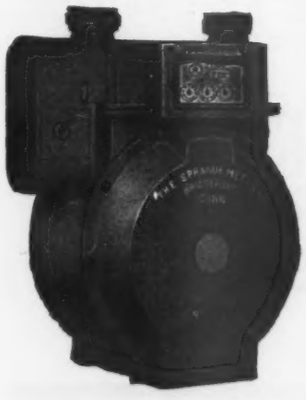

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